



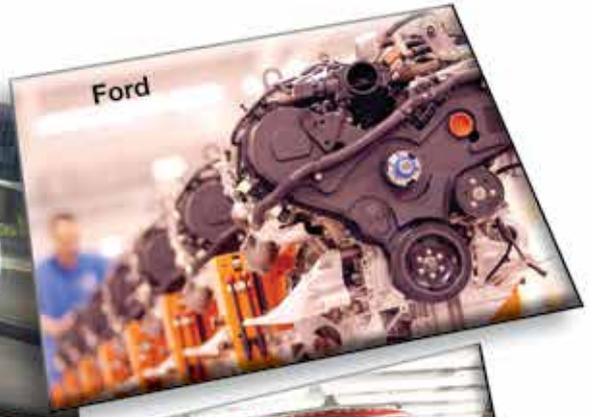
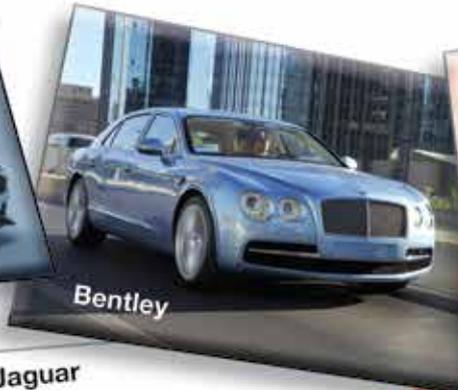
HM Government

Industrial Strategy: government and industry in partnership



# Driving success – a strategy for growth and sustainability in the UK automotive sector

UK automotive products:  
Cars and motorcycles



# Contents

<b>Foreword</b>	<b>3</b>
<b>Executive summary</b>	<b>5</b>
Challenges and opportunities	6
Investing in innovation and technology	6
Enhancing supply chain competitiveness and growth	7
Investing in people – ensuring the right skills	8
A business environment that enables a competitive automotive industry	8
<b>1 The UK automotive industry</b>	<b>9</b>
Overview of the sector	9
Competitiveness – a high productivity sector	10
Enhancing UK competitiveness: strengths and weaknesses	12
Vision for the UK automotive sector	16
<b>2 Investing in innovation and technology</b>	<b>18</b>
Success through collaboration	21
Developing more detailed technology roadmaps	24
Maintaining the UK’s strength in propulsion systems	26
Hydrogen and fuel cells	31
Enhanced links with motorsport	31
Enhancing collaboration with the research base	32
Better engagement with EU funding	32
Delivering intelligent mobility	32
Future technologies	33
<b>3 Enhancing supply chain competitiveness and growth</b>	<b>34</b>
Key challenges for the supply chain	37
Quantifying and capitalising on the business opportunity for the UK supply chain	38
Improving long-term supply chain competitiveness	40
Encouraging inward investment in the UK supply chain and creating export opportunities	44
Access to finance	47
Innovative processes for premium manufacturers	48

<b>4</b>	<b>Investing in people – ensuring the right skills</b>	<b>50</b>
	Developing a pipeline of skilled people	52
	A framework for automotive sector skills	56
	Encouraging young people to work in automotive	61
	Getting graduates and postgraduates into the automotive sector	64
<b>5</b>	<b>A business environment that enables a competitive automotive industry</b>	<b>67</b>
	Improving the attractiveness of the UK as a place to invest	68
	Maintaining strong interaction with Europe	69
	Providing a supportive national and local business environment	72
	Creating a competitive and supportive domestic market for vehicles	78
<b>6</b>	<b>Next steps</b>	<b>79</b>

## Foreword

The UK automotive industry has been leading the charge to demonstrate to international investors that we excel at advanced manufacturing and engineering in this country. Over £6 billion of investment in the UK industry in recent years makes it clear that the message is being received.

This renaissance has been facilitated by an effective and partnership approach from the Government and the industry through the Automotive Council that we chair. Over the last four years we have worked together to establish a clear roadmap for technology and to understand the opportunities for the UK supply chain.

This strategy sets out the actions we will take collaboratively to secure the next stage in the growth of the sector. We will work together to deliver our vision for the sector – and ensure that the UK is well placed to benefit from even more investment in production and in critically important research and development activity. It also provides focus for our joint effort to bolster our domestic supply chain and ensure people with the right skills are available to support a growing and nationally important industry.

We are certain that successful implementation of this strategy will secure the future of the automotive industry in the UK and build on our recent success.



A stylized, handwritten signature in black ink, consisting of a large, sweeping 'V' and 'C'.

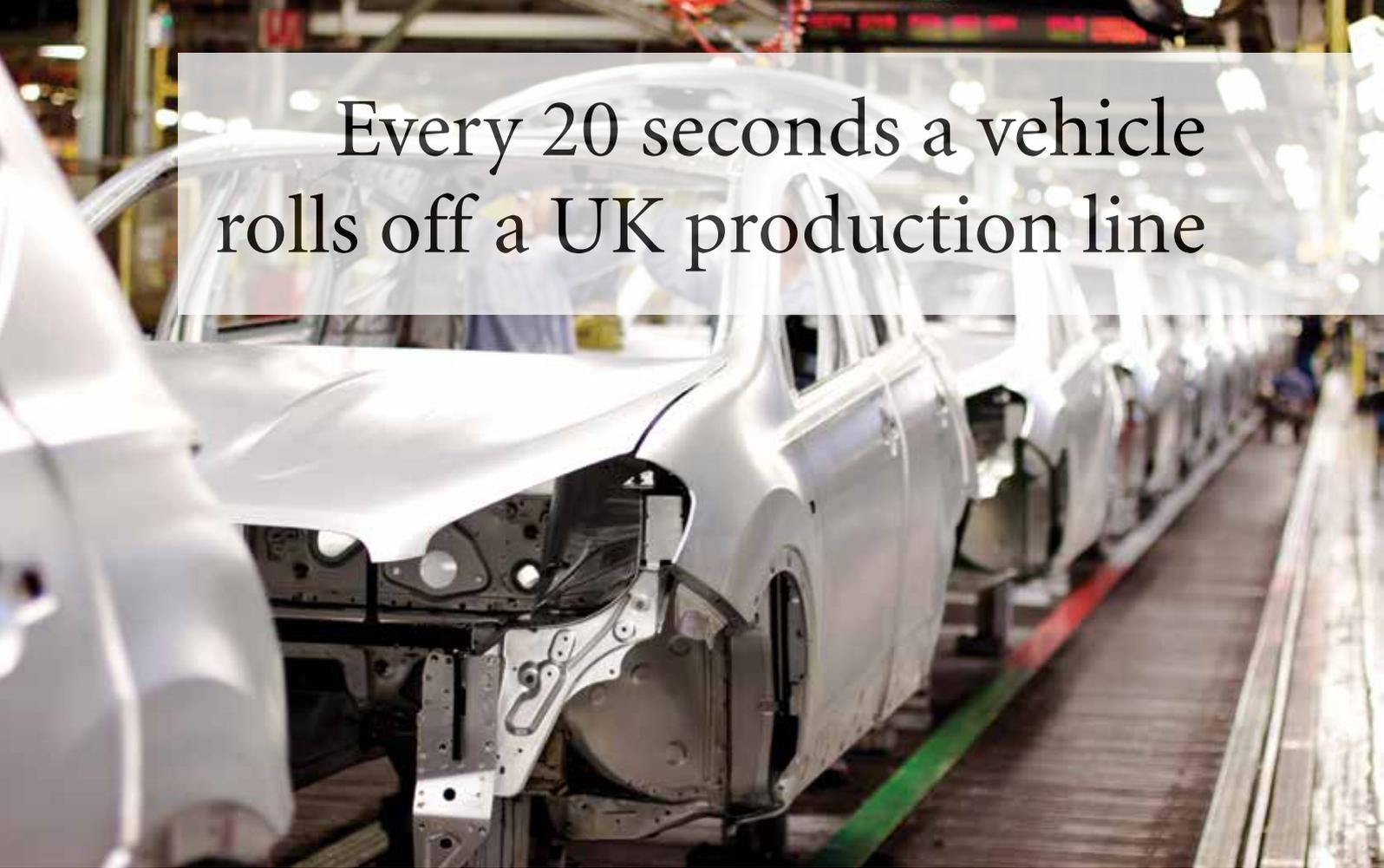
**The Rt Hon Dr Vince Cable MP**  
Secretary of State for Business,  
Innovation and Skills and Government  
Co-chairman of the Automotive Council



A handwritten signature in black ink that reads 'R. Parry-Jones'.

**Professor Richard Parry-Jones CBE**  
Industry Co-chairman of the Automotive  
Council

UK produced  
1.58 million  
vehicles in 2012



Every 20 seconds a vehicle  
rolls off a UK production line

£6 billion investment by  
vehicle makers over last  
two years

## Executive summary

Over the last few decades the automotive industry in the UK has been completely transformed. Supported now by a strong partnership with Government, it is recovering from the recession and growing.

A flexible workforce, openness to creativity and innovation and a reputation for good design has attracted £6 billion of investment in the last two years from global vehicle manufacturers.

Britain is the fourth largest vehicle producer in Europe, making 1.58 million vehicles in 2012. Every 20 seconds a car, van, bus or truck rolls off a UK production line. Over 80 per cent of these are exported to more than 100 countries.<sup>1</sup>

The challenge is to maintain this momentum to secure the long term future of the sector by growing the UK share of the value chain and by getting ahead of the game in research and development (R&D) on ultra-low emission vehicles. This strategy sets out how this might be achieved over the next 20 to 30 years.

The foundations for this long-term partnership approach between industry and government were laid in 2009 with the setting up of the Automotive Council. This strategy sets out a shared vision for a UK automotive manufacturing industry that is:

- Diverse, dynamic, growing and globally competitive
- Making a large and increasing economic contribution to employment and prosperity in the UK
- Playing a decisive role in developing and manufacturing low and ultra-low emission vehicles and technologies
- Supported by a highly skilled workforce and a strong supply chain
- Inspiring young people to pursue rewarding careers in engineering and manufacturing

<sup>1</sup> *Motor Industry Facts 2013*, Society of Motor Manufacturers and Traders, March 2013

## Challenges and opportunities

There are a number of challenges and opportunities ahead for the sector. This strategy focuses on four key areas:

- **Innovation and technology:** By 2040 almost none of Europe's new cars will be powered solely by a traditional petrol or diesel engine. This once in a lifetime technology change offers the UK an opportunity to create tomorrow's vehicles, increase its market share and create new supply chain companies. To deliver this the UK needs not only an increase in R&D investment, but also to capitalise on this – securing production in the UK. This requires innovative small and medium enterprises (SMEs) to be nurtured and investment by multinational companies
- **Supply chain:** The domestic supply chain is relatively weak. On average only a third of the parts that go into vehicles manufactured here are sourced from the UK. Stepping up the amount of UK content is dependent on a stronger automotive supply chain in the UK. But UK suppliers could take a much bigger share of the market with £3 billion of opportunities identified by the Automotive Council
- **Skills:** The scale of these future opportunities and meeting increasing production demand has highlighted a shortage of engineers and other skilled workers. The UK needs to build up a comprehensive talent pipeline including in the supply chain, starting in schools and encouraging a career path to apprenticeships, graduates and post graduates. Failure to do this will make the UK less attractive as a place to invest and will restrict supply chain growth
- **Business environment:** The UK faces stiff competition from other countries that strategically support advanced manufacturing. This can include significant R&D spending and tax breaks and strong incentives to encourage investment by suppliers. Strategic partnership is key to improve the business environment for the UK automotive sector

If the UK is going to build on the recent success of the automotive sector, it is vital that these opportunities are seized and the challenges tackled. To achieve this, the Government and industry have worked together to develop a strategy which identifies the actions that need to be taken collectively.

## Investing in innovation and technology

The development and commercialisation of new automotive technologies in the UK is critical to the medium to long-term future of the sector. Action is required now to secure future development and production in the UK. Government and industry have agreed the following:

- **Investing in a new Advanced Propulsion Centre (APC):** The Government and industry will invest around £1 billion over 10 years in a new centre to develop, commercialise and manufacture advanced propulsion technologies in the UK.

This investment is expected to secure at least 30,000 jobs currently linked to producing engines and could create additional jobs in new supply chains

- **Improving co-ordination and collaboration with academic research:** The Automotive Council and Engineering and Physical Sciences Research Council (EPSRC) will set up an advisory group to help align research funding with industry challenges where relevant. This will ensure the UK remains at the forefront of R&D work
- In addition, the industry will set out its view of the key technologies for the UK, how it can access more EU R&D funding and look at identifying future technologies such as intelligent networking of cars

## Enhancing supply chain competitiveness and growth

It is important to understand the barriers to growth for home grown firms and further investment in the UK and have an action plan to tackle these. The Government and industry is committed to:

- **Supporting inward investment:** The Government has set up a new Automotive Investment Organisation (AIO) within UK Trade & Investment (UKTI) funded by up to £3 million over the next two years. Led by Joe Greenwell, the former Chairman of Ford of Britain, it will take strategic direction from the Automotive Council. The AIO's aim is to improve the image of the UK as a place for automotive suppliers to invest and provide first contact to key potential investors



- **Improving access to finance:** Access to finance is vital to help the UK supply chain grow. A key issue is access to tooling finance. Without it the UK supply chain, including SMEs, cannot support vehicle manufacture growth and production is likely to go abroad. The automotive industry and the banks have developed a high-level framework that sets out principles for how they will work together to provide supply chain finance. The next stage will be to put this work into practice
- In addition, the industry is prioritising action, including a development programme, to enhance supplier capacity and capability

## Investing in people – ensuring the right skills

The industry has agreed a collective road map setting out a common view of what skills and training are needed to address the skills gaps. This will underpin how the industry and government work together to address the skills shortage. Early outcomes of this work include:

- **Apprentices and Graduates:** Working together to improve the quality and quantity of apprentices, graduates and postgraduates in the automotive industry. The industry members of the Automotive Council expect to take on more than 7,600 apprentices and 1,700 graduates over the next five years
- **Young people:** Attracting more young people, especially women, into automotive careers by initiatives such as:
  - Lending the Automotive Council's endorsement to several high-quality and effective school, graduate and post-graduate schemes
  - The Automotive Council developing a scholarship scheme for promising university students who are sponsored through their degrees by individual companies

## A business environment that enables a competitive automotive industry

A supportive business environment in the UK is critical to sustaining the competitiveness of the sector and as the first choice for investment. Government and industry have identified the following issues as key to the attractiveness of the UK.



- **Flexible labour market:** Maintaining and enhancing the UK's flexible labour market as a key competitive advantage
- **Local engagement:** Regular and strategic engagement between the Automotive Council, local enterprise partnerships (LEPs), devolved partners and other local decision makers in areas with a strong automotive link
- **EU engagement:** Maintaining proactive engagement with the European Union (EU) so that the UK has continued access to the Single Market and an influential voice in the development of regulations
- **Free trade:** Supporting key free trade agreements to boost exports through reciprocal access to markets
- **Support for ultra-low emission vehicles:** Continuing to support the early market for ultra-low emission vehicles. This has encouraged investment in the manufacture of ultra-low emission vehicles in the UK. The Government will publish a detailed strategy on ultra-low emission vehicles later this year

# 1 The UK automotive industry

- 1.1 The UK automotive industry is of strategic importance to the UK. It accounts for 129,000 jobs in over 2,700 businesses accounting for 5.2 per cent of manufacturing employment and 7.3 per cent of manufacturing output.<sup>2</sup> In recent years, the industry has seen its fortunes transformed, and has now grown to become the fourth largest automotive producer in Europe, 14<sup>th</sup> globally.<sup>3</sup>
- 1.2 Critical for this success have been improvements in UK competitiveness, significant inward investment into the UK industry and a strong partnership between the industry and the Government.

## Overview of the sector

- 1.3 The UK automotive sector is very diverse. There are more than 40 companies manufacturing vehicles in some of the most productive plants in Europe. These include 11 of the world's global vehicle and engine manufacturers – Aston Martin, BMW (MINI and Rolls Royce), Ford, General Motors (Vauxhall), Honda, Jaguar Land Rover, Lotus, MG, Nissan, Toyota and Volkswagen (Bentley) - as well as specialist brands, such as McLaren and Morgan, and Triumph motorcycles. The presence of strong premium and niche vehicle producers in the UK mean that the UK is second in the world to Germany for premium vehicles.
- 1.4 There are also major manufacturers of commercial vehicles including Leyland Trucks, Dennis Eagle, Wright Bus, Optare and Alexander Dennis. And construction, agriculture and other specialist equipment makers Case New Holland, Caterpillar, JCB, Komatsu, Perkins, Terex and Twaites. The UK is fourth in the world for construction equipment and the second largest net exporter of construction equipment.
- 1.5 The automotive industry is an important part of the UK economy. The sector is sustaining high levels of growth, with production in the UK growing to

<sup>2</sup> *Annual Business Survey, 2011*, Office for National Statistics, June 2013

<sup>3</sup> *2012 Production Statistics*, International Organization of Motor Vehicle Manufacturers (OICA), 2013

1.6 million vehicles and 2.5 million engines in 2012 and production set to increase at 9 per cent a year.<sup>4</sup>

- 1.6 The manufacturing supply base includes nine of the world's top ten suppliers and the industry is further supported by a world class automotive design engineering sector including companies like Ricardo, Lotus, Zytec and Prodrive. The UK also has two of the most renowned development facilities anywhere in the world – Millbrook and MIRA. Currently eight out of the 11 Formula 1 teams are based in the UK. In 2011 over £1.5 billion was invested in automotive research and development projects by business.<sup>5</sup>

### Impacts of the recession

- 1.7 In 2009, the sector produced just over one million vehicles – the lowest level since 1956.<sup>6</sup> Employment had fallen to 158,000 from 177,000 in 2008.<sup>7</sup> This reflected the impact on demand from the recession, with EU demand continuing to be weak as a result of on-going economic challenges in the euro zone. It also highlighted the significant resistance to restructuring to take out excess car production capacity across the continent.
- 1.8 In addition the UK had a large negative balance of trade and a weak pipeline of science, technology, engineering and mathematics (STEM) skills for automotive. However, the UK sector did benefit from a weaker exchange rate and the high degree of flexibility and productivity of its workforce – ranked second in the EU behind only Germany.<sup>8</sup>

### Competitiveness – a high productivity sector

- 1.9 The sector's turnover grew 16.8 per cent between 2010 and 2011. Over the same period gross value added grew by 11 per cent. In recent years the UK automotive industry has achieved very strong productivity growth. Progress was interrupted by the recession, when the industry was reluctant to let good people go in the hope of a quick recovery. As demand growth returned, so productivity rose again, with the vehicle/engine sector value-add per employee now nearly double the UK manufacturing average, growing strongly between 2010 and 2011, whilst the automotive components sector is only just below the overall average.<sup>9</sup>

<sup>4</sup> *Motor Industry Facts 2013*, Society of Motor Manufacturers and Traders, March 2013 and *Capturing Opportunity*, KPMG, September 2012

<sup>5</sup> *Business Enterprise Research and Development, 2011*, Office for National Statistics, November 2012

<sup>6</sup> *Motor vehicle production*, Office for National Statistics, 2007 and *Motor Industry Facts 2013*, Society of Motor Manufacturers and Traders, March 2013

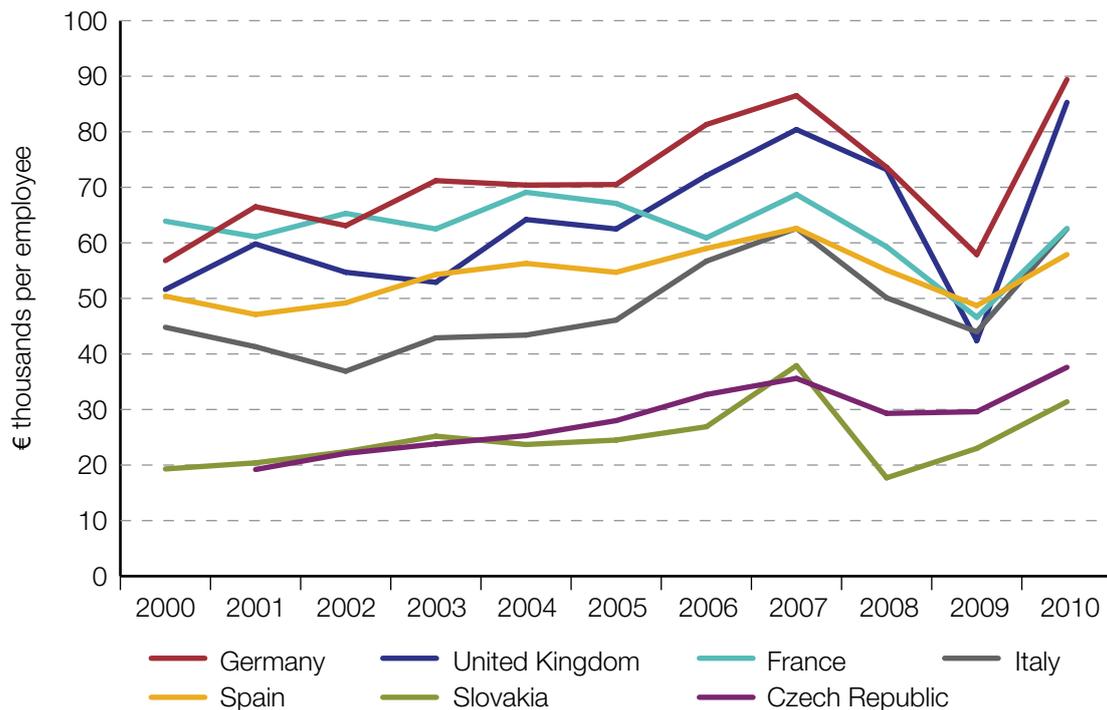
<sup>7</sup> *Annual Business Survey, 2011*, Office for National Statistics, 2013

<sup>8</sup> *Structural Business Statistics, 2011*, Eurostat, February 2013. Data for NACE code C29.

<sup>9</sup> *Annual Business Survey, 2011*, Office for National Statistics, 2013. Data for SIC29.1 vehicles/engines. Parts sector balance of SIC29 excluding SIC29.1

1.10 This has led to strong growth in the relative competitiveness of the UK automotive sector in recent years, by comparison with the rest of Europe. In terms of labour productivity, the UK rose from third position in 2000 to second in 2010.

Chart 1.A: International comparison of automotive labour productivity



Source: Structural Business Statistics, 2011, Eurostat, February 2013. Data for NACE code C29.

- 1.11 Automotive is one of the UK's leading export sectors by value, generating £30.7 billion revenue in 2012 and representing around 6.3 per cent of all UK exports. Sales to the EU26 accounted for 46 per cent of total automotive sector exports in 2012.
- 1.12 The global auto industry is forecast to grow from 77.7 million cars, light trucks and commercial vehicles manufactured in 2012 to 96.3 million in 2016. In addition, there is a strengthening trend towards premium vehicles in line with middle class income growth in developing nations.<sup>10</sup> The UK is well placed to take advantage of this opportunity.
- 1.13 This has provided the backdrop to significantly increased investment by vehicle and engine makers in the UK. Over £6 billion of investment was announced between 2010 and 2012, and this rate continues into 2013 with announcements by vehicle and engine makers including Aston Martin, Ford,

<sup>10</sup> Global Auto Forecast, R.L. Polk & Co., January 2012 and *The Challenges for the European Automotive Industry*, R. L. Polk & Co., July 2012

Jaguar Land Rover and Toyota.<sup>11</sup> UK vehicle production increased to 1.58 million units in 2012, up 7.7 per cent over 2011. Of this 81.4 per cent of vehicles were exported.<sup>12</sup> The increased investment means the Society of Motor Manufacturers and Traders (SMMT), the main sector trade association, is expecting growth to continue. They have published independent forecasts suggesting the UK could be on track to build two million vehicles in 2017 as part of a wider European recovery.<sup>13</sup>

## Enhancing UK competitiveness: strengths and weaknesses

- 1.14 The UK cannot be complacent and assume that recent success will continue without constant focus on continually improving competitiveness. This strategy identifies the key challenges that must be met to ensure current strengths are retained and enhanced, areas of weakness are addressed and opportunities for future growth are captured.
- 1.15 An assessment of the key strengths, weaknesses, opportunities and threats for the UK automotive sector is shown in Table 1.A. This emphasises that the UK has many strengths that should be retained but the real challenges lie in:
- Ensuring that the business environment in the UK remains competitive
  - Strengthening the UK automotive supply chain
  - Maintaining UK R&D leadership as key automotive technologies change, especially changes to ultra-low emission propulsion systems
  - Making sure skilled people want to work in the automotive sector – and that those already in the sector are able to enhance their skills as technology changes

<sup>11</sup> *Recent investment announcements from UK automotive companies*, SMMT website, [www.smmmt.co.uk/investment](http://www.smmmt.co.uk/investment). Checked 8 July 2013.

<sup>12</sup> *Motor Industry Facts 2013*, Society of Motor Manufacturers and Traders, March 2013

<sup>13</sup> *European Car and Light Commercial Vehicle Production Outlook*, SMMT, May 2013



Table 1.A: Assessment of the UK automotive sector

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ Home to 11 global and over 30 niche vehicle and engine manufacturers</li> <li>■ Globally recognised premium, niche and luxury brands and associated unique manufacturing techniques</li> <li>■ Strong international manufacturing capabilities and process leadership</li> <li>■ Powertrain design and manufacture</li> <li>■ World leading motorsport capabilities</li> <li>■ Ability to innovate including internationally strong academic research base</li> <li>■ Flexible workforce</li> <li>■ Competitive tax regime</li> <li>■ EU market access and openness to trade</li> <li>■ Sizeable, two million vehicle domestic market</li> <li>■ Diversity of export markets with no overdependence on one region</li> <li>■ British brand and design, including many UK premium brands</li> <li>■ Strong, visible support from Government and a supportive business environment</li> <li>■ Supportive innovation system, in particular the Technology Strategy Board</li> </ul>	<ul style="list-style-type: none"> <li>■ Some key capabilities and capacity no longer available in the UK</li> <li>■ Shrinking engineering skills base and ageing workforce</li> <li>■ Relatively weak domestic supply chain – SMEs not routinely nurtured to develop their innovative, technological expertise</li> <li>■ Lack of UK based Tier-one suppliers</li> <li>■ Limited automotive R&amp;D done in the UK by business – only one volume manufacturer developing complete cars</li> <li>■ Dependent on a few key volume platforms with investment decisions taken by overseas parent companies</li> <li>■ Limited ability to attract, train and retain talent in the auto industry – especially in SMEs in the supply chain</li> <li>■ Access to finance a key challenge for SMEs in the supply chain</li> <li>■ Support system for innovation, skills and business development that is overly fragmented</li> </ul>

### Opportunities

- Capacity exists or is planned to grow output to over two million vehicles
- Increasing capacity and breadth of supply chain capabilities to meet demand
- Global shift to ultra-low emission propulsion systems with some leading low carbon technologies developing in the UK
- Securing UK R&D, manufacturing and market for new technologies and vehicles
- Creation and industrialisation of innovations developed in universities, motorsport and SMEs
- Processes supporting the premium industry already UK domiciled
- Increasing exports from UK suppliers
- Could commercialise more motorsport ideas in mainstream vehicles
- Niche British brands are popular worldwide and could increase sales
- Local and devolved support for development of the automotive industry
- Bring longer term time horizon to existing excellent business support programmes

### Threats

- Tier-one R&D centres will take UK technology overseas for industrialisation
- Strong global competition, including from emerging economies
- Competitor nations more aggressively incentivising supplier investment in R&D and manufacturing
- Inward investors (and re-investors) deterred by uncertainty over the UK's relationship with the EU
- UK leadership in reducing greenhouse gas emissions leading to higher costs of doing business in the UK

## Vision for the UK automotive sector

- 1.16 To ensure the future health of the industry in the UK, the industry and the Government have worked together to strengthen the sector. In 2009 the Automotive Council was established to institutionalise this collaboration and enable a strategic partnership between government and industry.
- 1.17 The Automotive Council has provided strong leadership and focus across government and industry, identifying key areas of UK competitive advantage as well as weaknesses to secure and increase long-term automotive investment in capital, R&D and skills and to further improve the attractiveness of the UK as a place for automotive investment.
- 1.18 **In this strategy, the industry and the Government are recommitting to working together through the Automotive Council.** This strategy sets out the future focus of work for the Automotive Council. The Automotive Council has identified a shared vision for automotive manufacturing in the UK. This vision emphasises the broader focus being adopted in this strategy.
- 1.19 The shared vision is for a UK automotive industry that is:
- Diverse, dynamic, growing and globally competitive
  - Making a large and increasing economic contribution to employment and prosperity in the UK
  - Playing a decisive role in developing and manufacturing low and ultra-low emission vehicles and technologies
  - Supported by a highly skilled workforce and a strong supply chain
  - Inspiring young people to pursue rewarding careers in engineering and manufacturing
- 1.20 To deliver this vision, this strategy sets out action that will be taken by industry, by the Government and jointly to:
- Invest in innovation and technology
  - Enhance supply chain competitiveness and growth
  - Invest in people to ensure they have the right skills for an evolving industry
  - Ensure a business environment that enables a competitive automotive industry
- 1.21 This strategy focuses on the design and manufacture of vehicles and engines and their associated components. It does not cover the wider automotive sector such as retail and maintenance. This part of the sector is also a significant part of the UK economy but faces different challenges to the manufacturing part of the sector.

1.22 While the production of vehicles in the UK is largely based in England, there are also key manufacturers and suppliers in Wales (including engines and supply chain), Scotland (including buses and tyres) and Northern Ireland (including buses and tyres). Industrial policy is a matter for the devolved administrations in these areas. The UK Government does provide UK-wide support for trade and for technology development.



## 2 Investing in innovation and technology

- 2.1 A strong innovation system can drive – and increase – the competitiveness of both the UK and its automotive industry. International and domestic analyses demonstrate the importance of innovation for growth across economies and sectors. The UK has a strong tradition of innovation. To make the most of the opportunities in the automotive sector, it is vital for the UK to be in a position to take part in the development and delivery of major future technologies and systems.
- 2.2 To maintain and enhance the UK's competitiveness as a place for businesses to invest in innovation, investment and support must be targeted to develop areas of current and potential future comparative advantage over other countries. The automotive industry believes that the framework for innovation and research and development (R&D) in the UK is supportive, building on academic research excellence. However, the system can appear fragmented to overseas investors. A priority is to enable business needs and academia to be more effectively coordinated.
- 2.3 Technology is a critical enabler of change and a driver of global competitive advantage. This is particularly true in the crowded and discerning automotive market where technology facilitates process and product innovation. This supports enhanced functionality and product differentiation. Leading automotive technologies also form part of the eight great technologies that the Government has identified, in particular robotics and autonomous systems, advanced materials and energy storage.
- 2.4 Despite considerable strengths, the UK cannot afford to be complacent to ensure future competitiveness with other countries. Measuring the generosity of government support for innovation is complex, and OECD analysis shows government support for business R&D is not always well correlated with domestic R&D intensity.<sup>14</sup> Government spending on R&D as a share of GDP is influenced by each country's sectoral mix, which means the results are not directly comparable. But on that measure, the UK scores relatively low – ranking 17<sup>th</sup> in the OECD.<sup>15</sup> The UK also ranks low when looking at Gross

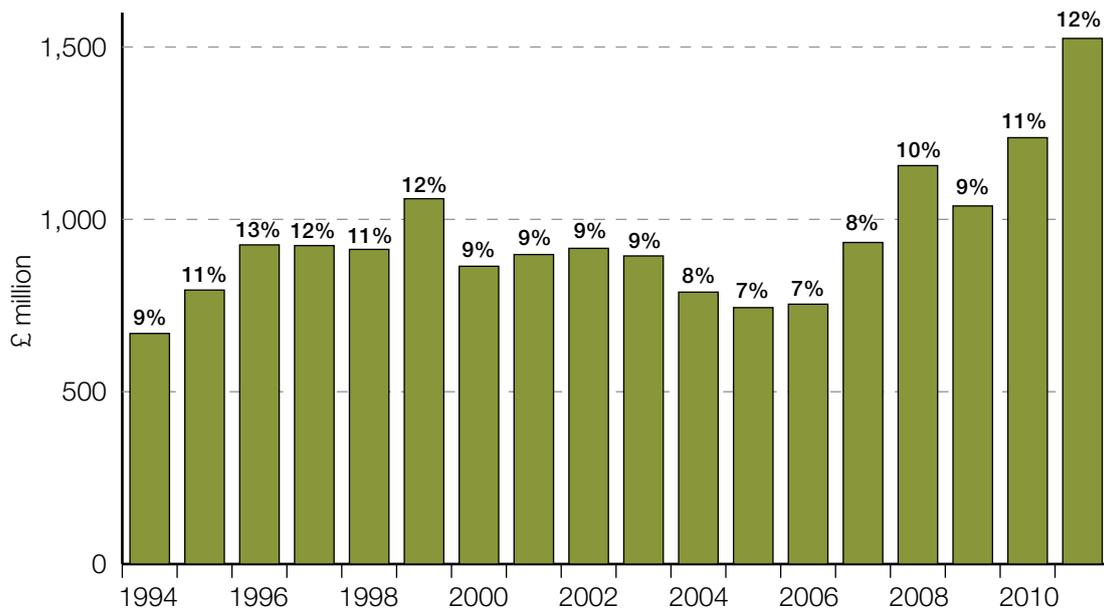
<sup>14</sup> *Science, Technology & Industry Scoreboard*, OECD, 2011

<sup>15</sup> *Science, Technology & Industry Scoreboard*, OECD, 2011

Expenditure in R&D as a proportion of GDP, spending below both the OECD and EU averages.<sup>16</sup>

- 2.5 The UK has a strong knowledge base to exploit and invests broadly in innovation. Intangible investment was strong compared with other leading economies in 2012.<sup>17</sup>
- 2.6 The automotive sector is highly innovative. Investment in R&D in the UK has increased in recent years – both in value and as a share of UK manufacturing as Chart 2.A shows. Business investment in automotive R&D exceeded £1.5 billion in 2011.

Chart 2.A: UK Automotive R&D (value and share of UK manufacturing sector)



Source: Business Enterprise Research and Development, 2011, Office for National Statistics, November 2012

- 2.7 In 2011, the automotive sector reinvested 13.7 per cent of its value added in R&D – second only to aerospace, and representing a reinvestment rate over six times that of the UK economy average. Of total automotive R&D, 84 per cent was focused on experimental development activity – ahead of all other manufacturing sectors.<sup>18</sup> However, automotive investment in basic and applied research was the lowest proportion of all sectors at 16 per cent.
- 2.8 There are strong incentives for research and development through the tax system. This includes tax credits for both small and large businesses, and the establishment of a Patent Box that provides an effective 10 per cent

<sup>16</sup> Science, Technology & Industry Scoreboard, OECD, 2011

<sup>17</sup> Annual Innovation Report, Department for Business, Innovation and Skills, November 2012

<sup>18</sup> Business Enterprise Research and Development, 2011, Office for National Statistics, November 2012

Corporation Tax rate on profits from patents granted in the UK or European patents offices.

- 2.9 The Government also supports research and innovation through the Research Councils and the Technology Strategy Board (TSB), covering the whole of the UK, and the Higher Education Funding Council for England, and its devolved counterparts in Scotland, Wales and Northern Ireland. It also supports innovation through business support organisations, and provides intellectual property protection, standards, measurement, accreditation and design.
- 2.10 As a key part of its support for ultra low emission vehicles in the UK, the Government is providing targeted funding for R&D through the Office for Low Emission Vehicles (OLEV). OLEV was established in 2009 as a cross-government team working to position the UK as a premier global market for these vehicles. As well as funding R&D activities, OLEV is also supporting the provision of the refuelling infrastructure needed by ultra-low emission vehicles (ULEVs) and providing a consumer incentive to reduce the upfront purchase price of this emerging technology. OLEV is providing funding of some £400 million to support these programmes until 2015. The Government is committed to further supporting the transition to ULEVs out to 2020 (or until the early market is fully established) and will make funding available through the Department for Transport to continue this support. OLEV and the Department for Transport will shortly publish details of this commitment.
- 2.11 The TSB has been particularly important for the automotive industry – both through its targeted funding and close collaboration as part of the Automotive Council and through its consistency of approach over a number of years. Key TSB interventions include:
- **Low Carbon Vehicles Innovation Platform** – brigades funding, notably from TSB and OLEV with strategic contributions from EPSRC and BIS into a single delivery mechanism supporting collaborative R&D aligned with and in pursuit of the relevant strategic technologies identified by the Automotive Council
  - **High Value Manufacturing and Transport Systems Catapults** – physical centres where the very best of the UK’s businesses, scientists and engineers work side by side on late-stage research and development – transforming “high potential” ideas into new products and services to generate economic growth
- 2.12 In Spending Round 2013, the Government announced an additional £185 million resource funding for the TSB in 2015-16 to support innovation.<sup>19</sup> OLEV and TSB are also funding a Low Carbon Truck Trial that will support UK road

<sup>19</sup> *Investing in Britain’s future*, HM Treasury, June 2013

haulage operators to buy and use low carbon trucks, trialling emerging technologies, and which will encourage UK supply chain manufacturers in this sector.

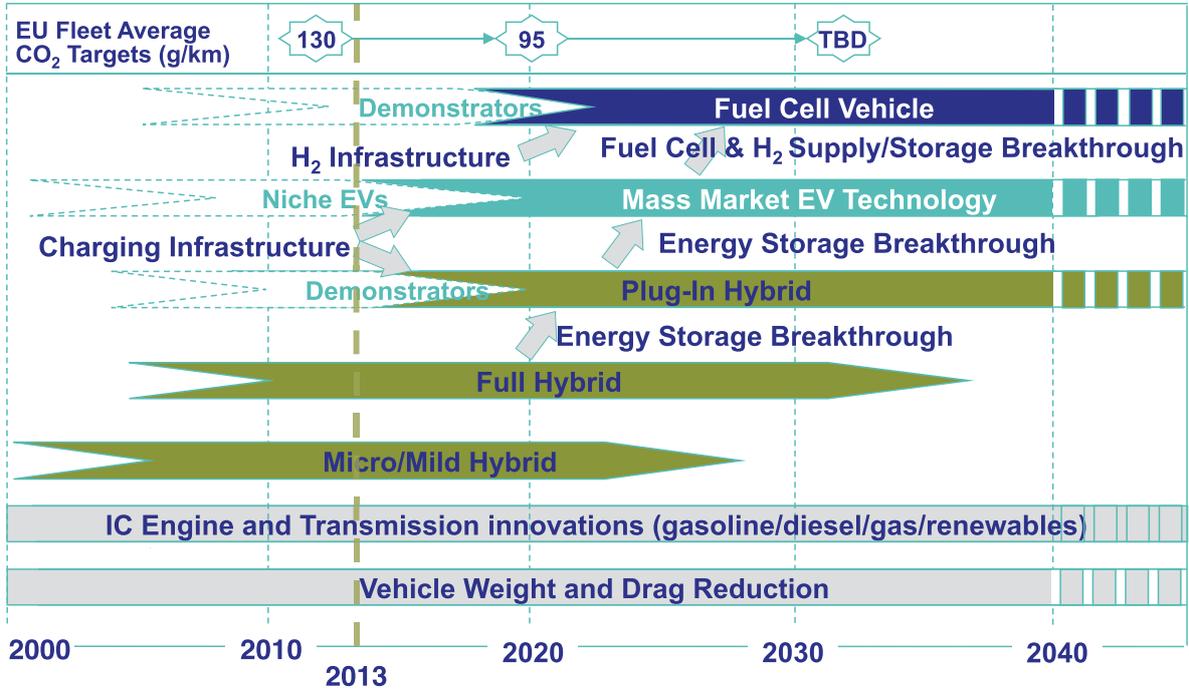
- 2.13 The Government's support for innovation and technology is not limited simply to direct investment in R&D. Government also has an important role in enabling the wider market conditions that foster innovation. For example, through ensuring public procurement of vehicles encourages the adoption of new technologies where these represent the best value for money to meet a defined requirement. The Government recognises the benefit of applying the right support for both the supply of these vehicles but also in creating the conditions to enable demand to grow.
- 2.14 For the automotive industry, an effective innovation system matches research and innovation support to the key technology challenges the industry is seeking to address. The Automotive Council has identified current challenges and developed a cross-industry agreement on the required technologies. Both the Government and the industry are committed to providing a supportive environment for collaborative R&D in the UK. **In this strategy, the industry recommits to the Automotive Council prioritisation of the strategic technologies, and to on-going collaboration with the Technology Strategy Board (TSB), the Engineering and Physical Sciences Research Council (EPSRC) and other funders and delivery bodies on meeting those priorities.**

## Success through collaboration

- 2.15 An industry consensus passenger vehicle technology roadmap (Figure 2.A) was developed and published as part of the New Automotive Innovation and Growth Team report in 2009.<sup>20</sup> Through the Automotive Council this continues to successfully influence the R&D agenda, bringing together industry, government and academia in collaboration to deliver against a unifying vision.

<sup>20</sup> *An Independent Report on the Future of the Automotive Industry in the UK*, New Automotive Innovation and Growth Team, 2009

Figure 2.A: Passenger vehicle technology high level roadmap

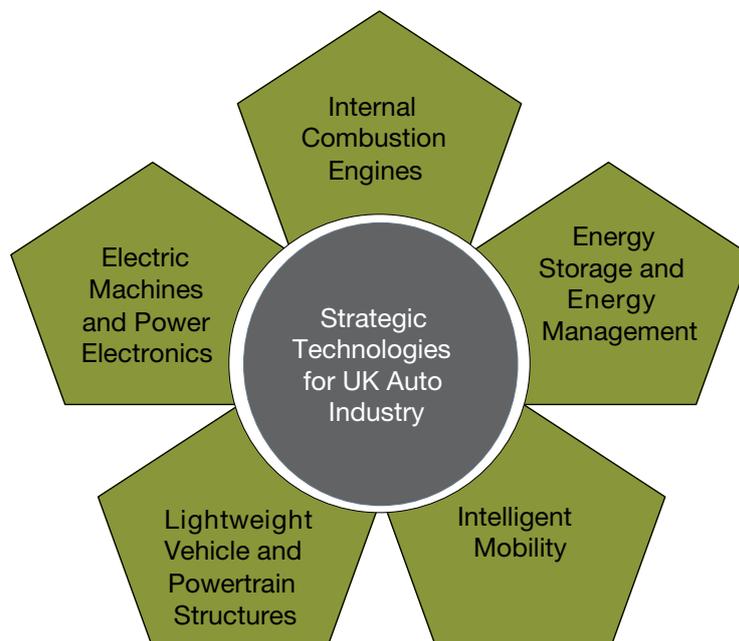


Source: An Independent Report on the Future of the Automotive Industry in the UK, New Automotive Innovation and Growth Team, 2009



2.16 This initial examination of research challenges and an analysis of UK capability led to the identification of five strategic technology themes where the UK could show leadership through specialisation. These include internal combustion engines; electric machines and power electronics; energy storage and energy management; lightweight vehicle and power train structures; and intelligent mobility. Figure 2.B summarises these strategic technologies.

Figure 2.B: Automotive Council strategic technology themes



2.17 Since this first consensus statement of R&D themes, the Automotive Council has published further roadmaps for commercial vehicles and off-highway equipment and supports the Low Carbon Vehicle Partnership-led bus technology roadmap published in 2012.<sup>21</sup>

2.18 This evidence-rich analysis by the Automotive Council has directly resulted in a step-change in the level of alignment and coordination between government, industry and the research base in the search for solutions and business growth. For example, £9 million of public funding plus £4m from industry, has been secured for the UK Energy Storage Research Centre. A new Virtual Engineering Centre has also been established at Daresbury Laboratory to enable virtual prototyping.

<sup>21</sup> Available to Low Carbon Vehicle Partnership members at [www.lowcvc.org.uk](http://www.lowcvc.org.uk)

## Developing more detailed technology roadmaps

- 2.19 Building on the positive impact of the passenger vehicle roadmap and the commercial and off-road roadmap, **the Automotive Council will publish, by the end of 2013, detailed consensus technology roadmaps for each of the priority technology areas.** These roadmaps define the key targets or drivers in each priority area. Each roadmap identifies technologies with the potential to meet the targets either in isolation or combined with other systems.
- 2.20 These consensus roadmaps will help guide future industry and government investment in R&D. Table 2.A describes the key features of the new roadmaps.

Table 2.A: Key features of forthcoming detailed technology roadmaps.

Roadmap	Key themes
Internal Combustion Engines	<p>The roadmap defines future priorities to improve engine thermal efficiency, improvements in systems efficiency and enabling technologies. Key focus areas are:</p> <ul style="list-style-type: none"> <li>■ Integration of combustion engines and electric machines to reduce cost and increase utility</li> <li>■ Downsizing and downspeeding including more sophisticated charge air/boost systems</li> <li>■ Fuel injection and variable valve &amp; actuation systems</li> <li>■ Waste heat recovery to shaft power or electricity production</li> <li>■ Low carbon liquid fuels</li> </ul>
Power Electronics & Electric Machines	<p>Mixed technology motors such as Permanent Magnet Switched Reluctance machines as well as Switched and Synchronous Reluctance machines are key features of the roadmap. Focus areas include improvements in:</p> <ul style="list-style-type: none"> <li>■ Advanced lower cost control electronics</li> <li>■ Conductivity in windings</li> <li>■ Topology &amp; innovative configurations</li> <li>■ Thermal management &amp; conduction</li> </ul>

Roadmap	Key themes
Energy storage	<p>Significant Improvements in existing battery chemistries, achieving in excess of 400Wh/kg at a cost of less than US\$250/kWh, next generation chemistries &amp; other storage technologies Key areas for progress are:</p> <ul style="list-style-type: none"> <li>■ Electrolytes, catalysts, dopants, additives, surface modification and coatings</li> <li>■ Scale up technologies to move from laboratory to prototype cells for in-field development</li> <li>■ Innovative storage technologies that offer improved cost, energy density &amp; packaging</li> </ul>
Lightweight Vehicle and Power Train	<p>To meet vehicle CO<sub>2</sub> targets, substantial vehicle weight reductions can be achieved through:</p> <ul style="list-style-type: none"> <li>■ Migration of motorsport/aerospace technologies initially into the premium sector and ultimately into high volume vehicle manufacture</li> <li>■ Advances in manufacturing/joining technologies for advanced low weight materials to achieve automotive scale and cost requirements</li> <li>■ Next generation multi-physics computer aided engineering for weight optimisation</li> <li>■ New vehicle topologies enabled by advanced materials</li> </ul>
Intelligent Mobility	<p>Increased road user demand will require more intelligent &amp; safer mobility to deliver a robust transport system. This will require improved communication, control and vehicle systems together with modal shift and demand management. Key technologies will include:</p> <ul style="list-style-type: none"> <li>■ Advanced data processing &amp; acquisition systems for multi-modal journey planning/optimisation</li> <li>■ Vehicle sensor fusion &amp; processes for safety critical on-board software development</li> <li>■ Communication systems/protocols for both vehicles and infrastructure</li> <li>■ Next generation driver assistance systems and autonomous control technologies</li> </ul>

## Maintaining the UK's strength in propulsion systems

- 2.21 The UK is currently a much more significant player in propulsion systems for cars than it is in finished vehicles, for example producing a third of all engines for Ford worldwide. The UK's expertise is focused on the design and manufacture of internal combustion engines.
- 2.22 Reducing vehicle carbon dioxide emissions to near zero requires a more holistic approach supported by major innovations in advanced combustion engine technology, breakthroughs in battery technology and electrification together with sustainable and ethical low carbon fuels. Ultimately this is also likely to include a shift to fuel cell electric vehicles. Substantial progress will also be required in new materials and manufacturing technologies to reduce vehicle weight. Failure to act would be expected to result in a loss of up to 30,000 jobs in the UK currently linked to production and R&D by 2040 with significant losses before that. This is also likely to undermine the future of the automotive sector in the UK.
- 2.23 As a result of this change, the UK has a once in a lifetime opportunity to increase the UK's global share of the automotive sector. In particular:
- There is unlikely to be one dominant technology for some time – but there are common components that are likely to be a part of all the competing systems such as electric motors and batteries
  - Supply chains for the new technologies do not yet exist – strength in previous technologies is no guarantee of the same strength in future
  - The UK can make a strong play in this space by capitalising on its existing comparative strength and experience in design, development and manufacture of powertrain in addition to its world-class specialist capabilities in the relevant new technology areas
  - The Research Councils and TSB ensure that there is a good flow of innovations at early stages of technology readiness in the UK
- 2.24 The average development cycle for a new powertrain is seven years and requires investment in both technology and manufacturing development. To progress development beyond the proof of concept phases requires significant investment – with £2 million per project enough to get to proof of concept but £30 million needed to demonstrate that the concept can be scaled up and manufactured. Full scale up and manufacturing readiness requires a further £50 million.
- 2.25 The gap from development to production readiness, often called the valley of death has long been recognised as an issue for UK industry, not just automotive. The automotive industry has proactively supported initiatives to address this issue. The Proving Factory innovatively seeks to bridge the valley

of death, see Case Study 2.A. However the scale of this initiative is limited and is insufficient to resolve the challenge for the full range of technologies needed for new propulsion systems.

### Case study 2.A: The Proving Factory

The Proving Factory has been set up to bridge the market ‘gap’ that exists between SME technology developers who are making innovative, low carbon products, and global vehicle manufacturers.

It is backed by £21.8 million of investment from the public and private sectors. £12.8 million in grant and loan funding has come from the Department for Business, Innovation and Skills through the Advanced Manufacturing Supply Chain Initiative, administered by Birmingham City Council. The project’s partners have committed an additional £9.1 million of private funding. The project will create 250 jobs directly and over 1,000 in the supply chain.

This is a collaborative initiative led by the technology-industrialisation specialist SME Productiv and the multinational Tata Steel, with partners MIRA and the Manufacturing Technology Centre, who are part of the High Value Manufacturing Catapult. The supporting partners include Jaguar Land Rover, Schaeffler, Unipart and the Midlands Assembly Network. As of June 2013, five technology developers have signed up use the Proving Factory: Bladon Jets, Flybrid, Torotrak, Drive Systems Design and Libralato.

The Proving Factory is unique to the UK automotive sector and will create new trusted manufacturing, assembly and validation facilities to introduce new low carbon products to the worldwide automotive market. Two factories will be established: component manufacturing at the Tata Steel site near Rotherham, and an assembly facility in the West Midlands, both providing employment and regeneration. Both of the factories will be in operation by the end of 2015. The project will industrialise the technologies and manufacture them in the UK, resulting in new, sustainable, flexible manufacturing facilities and skills in the Proving Factory and its supply chain.

- 2.26 In other sectors and in other countries large first tier suppliers play a coordinating role matching vehicle maker requirements with potential technological solutions. They are able to aggregate technology demand across multiple vehicle makers. In some cases vehicle makers also engage directly, often in collaboration with other vehicle makers or suppliers.



- 2.27 The UK does not have the strength of domestically headquartered vehicle makers and domestic first tier automotive suppliers for this to happen to the level needed. As a result non-UK suppliers currently acquire a large number of TSB-supported innovations. They usually take the technology to their home country for development.
- 2.28 At the same time, other countries are acting to try to secure their share of this opportunity. There is significant investment by our existing competitors including Germany, the USA and Japan. In addition emerging competitors are also acting in this space, notably China, India and Taiwan. These are generally programmes of investment over the next decade that amount to several billion pounds in each country.
- 2.29 **The Government and industry will invest around £1 billion over 10 years in a new Advanced Propulsion Centre (APC) to support the development of new supply chains for low carbon vehicles.** This will allow the UK to take the opportunities for new propulsion technologies required for the move to zero emission vehicles. It is estimated that this could secure up to 30,000 jobs currently linked to engine and broader vehicle production, with the potential to increase as global demand rises. This could also create additional jobs in new supply chains.

- 2.30 Investment is also expected to help anchor vehicle manufacturing in the UK and may help attract investment into the UK by Tier-one suppliers. A successful APC will enable:
- The positioning of the UK as an R&D hub and go-to location for powertrain development and manufacturing
  - An increase in global market share
  - More of the global supply chain to locate in the UK
  - Increased exports to growing global markets
- 2.31 The APC is being designed to work with the existing innovation system to support the industrialisation process. This will combine collaborative technology development by the APC partners with manufacturing process development, using the High Value Manufacturing Catapult and other partners as appropriate.
- 2.32 Funding will be considered for a full range of potential projects, including smaller early stage technology proof of concept R&D to more expensive commercialisation projects. These may include both technology and manufacturing readiness development.
- 2.33 In order to reduce risk for higher value projects, the APC will not only need to attract at least matched funding from industry for each project but also secure a commitment from the vehicle/engine makers to complete development cycles and allow open access to technology should it not be realised by the original partners.
- 2.34 Most of the APC funding will be focused on projects. However, the APC will have a small physical core of staff to be based within easy reach of expected major users to ensure effective collaboration. It will act as an international beacon for propulsion technologies, enable single-point SME access and showcase UK excellence. It will not duplicate existing facilities, nor be a sector silo. It may over time install new shared facilities where none exists or support improvements to facilities at Catapults. It will be open to other sectors such as rail and marine, where low carbon propulsion provides a growth opportunity.
- 2.35 SMEs will benefit through access to funding, access to customers and access to industrialisation and commercialisation know-how. They may ultimately have the option of developing production capabilities to grow into a Tier-one supplier.
- 2.36 It is expected that the APC will open for business during 2014. In advance of this, the Government is announcing up to £10 million is being made available by the TSB for highly innovative low carbon vehicle collaborative R&D projects that are closely aligned with the APC objectives and can demonstrate a strong potential for industrialisation.

## Industry commitment to the Advanced Propulsion Centre

These companies fully support the vision for the APC and will actively explore potential for investment in the Centre.



## Hydrogen and fuel cells

- 2.37 UKH<sub>2</sub>Mobility is a collaborative approach to evaluate the potential for hydrogen fuel cell electric vehicles. It brings together the utility, gas, infrastructure, fuel retail and car manufacturing sectors with three government departments. UKH<sub>2</sub>Mobility is looking at potential barriers to overcome and potential investment required to make the UK a leading global player in the hydrogen fuel cell electric vehicles market. It sets out a roadmap to commercialise hydrogen fuel cell electric vehicles in the UK from 2015. The results of the initial evaluation phase were released in February 2013.<sup>22</sup> **UKH<sub>2</sub>Mobility will produce a business case for hydrogen fuel cell electric vehicles by the end of 2013.**

## Enhanced links with motorsport

- 2.38 The UK has a strong motorsport sector that invests significantly in R&D to optimise performance. The 4,500 UK motorsport engineering companies typically reinvest around 30 per cent of revenues in R&D, and have a high level of engineering expertise.<sup>23</sup> While much of this R&D is only relevant to motorsport, there is a great deal more that could be done to take the opportunities for UK leadership that the motorsport investment provides. The mainstream automotive sector is not as well connected to motorsport as it could be. The motorsport industry also recognises the opportunities that can come from aligning racing regulations more closely with those for road vehicles.
- 2.39 **The Automotive Council will enhance engagement with the motorsport industry.** Better collaboration will allow for the sharing of new technologies and innovations. The Motorsport Industry Association (MIA) joined the Technology sub-group of the Automotive Council in early 2013.
- 2.40 In addition, the Government is working with the MIA on a survey of the motorsport industry to increase understanding of current motorsport activity, particularly in R&D. **The Automotive Council will use the results from the motorsport survey to identify priorities for future collaboration between the motorsport and mainstream automotive industries.**



Ford Fiesta RS WRC – Qatar M-Sport World Rally Team

<sup>22</sup> *Synopsis of Phase 1 Results*, UK H<sub>2</sub> Mobility, February 2013

<sup>23</sup> *A Statistician's Guide to the UK and Global Motorsport Industries*, Motorsport Industry Association, [www.the-mia.com/The-Industry](http://www.the-mia.com/The-Industry), extracted 1 July 2013.

## Enhancing collaboration with the research base

- 2.41 A key challenge is to ensure that the academic community – and their funding – reflect the key challenges the industry is seeking to resolve while maintaining academic independence. The Automotive Council has successfully worked to align Technology Strategy Board programmes with the strategic technologies outlined above. **To improve coordination and collaboration with the academic research community, the Automotive Council and EPSRC will establish an advisory group to help align research funding with industry challenges where relevant.**

## Better engagement with EU funding

- 2.42 There is significant funding for R&D available from the EU. As a Member State the UK contributes to this programme and it is important that UK companies make effective use of this support where it can support R&D activity.
- 2.43 Industry intelligence suggests that automotive businesses in other countries have been much more successful at accessing EU funding for R&D. Universities and some specialist companies seem to have been most adept at accessing projects under the Seventh Framework Programme for Research (2006-13), known as FP7.
- 2.44 The new European Green Vehicles Initiative, launched in March 2013 presents opportunities for the sector, with a proposed European Commission budget of €1.5 billion for “Energy Efficiency of Vehicles and Alternative Powertrains”. The Horizon 2020 programme has a much narrower remit than the FP7 programme for road transport and therefore has potentially more interesting and relevant projects for UK automotive companies.
- 2.45 **The Technology Group of the Automotive Council will consider the opportunities offered by EU R&D funding and how the UK automotive industry can collaborate to better access it.** This will include learning lessons from successful companies in the UK and elsewhere in Europe and from sectors such as aerospace that are more successful in securing EU funding.

## Delivering intelligent mobility

- 2.46 New intelligent transport technologies have the potential to transform the operation of road vehicles and users' relationship with them. This includes the ability to actively assist drivers and more intelligently manage road networks but the potential goes far beyond this. Truly autonomous vehicles could allow a total change in the ownership and use of vehicles. For example, car sharing would no longer require some vehicles to be parked up ready for use but could allow vehicles to transport themselves from one user to the next.

2.47 Intelligent mobility will form part of the work of the new Transport Systems Catapult. To enable further development of key technologies, the Automotive Council supports the high-level proposal to create a demonstration programme in the UK. This would demonstrate the potential of 'cloud-enabled mobility' in a variety of applications. **The industry sponsors of the intelligent mobility demonstrator programme will work with the Government to explore options for funding to bring intelligent mobility out of the laboratory and firmly into reality where effectiveness and the business case can be tested.**

## Future technologies

2.48 Since the Automotive Council was established in 2009, the focus of technology work has been on reducing emissions from vehicles, especially greenhouse gases. This reflects the key technology challenge faced by the industry over the next 30 years. Important progress is also being made on intelligent mobility. However there are also other technology needs where the UK has strengths that could further strengthen the UK automotive technology base. Examples include:

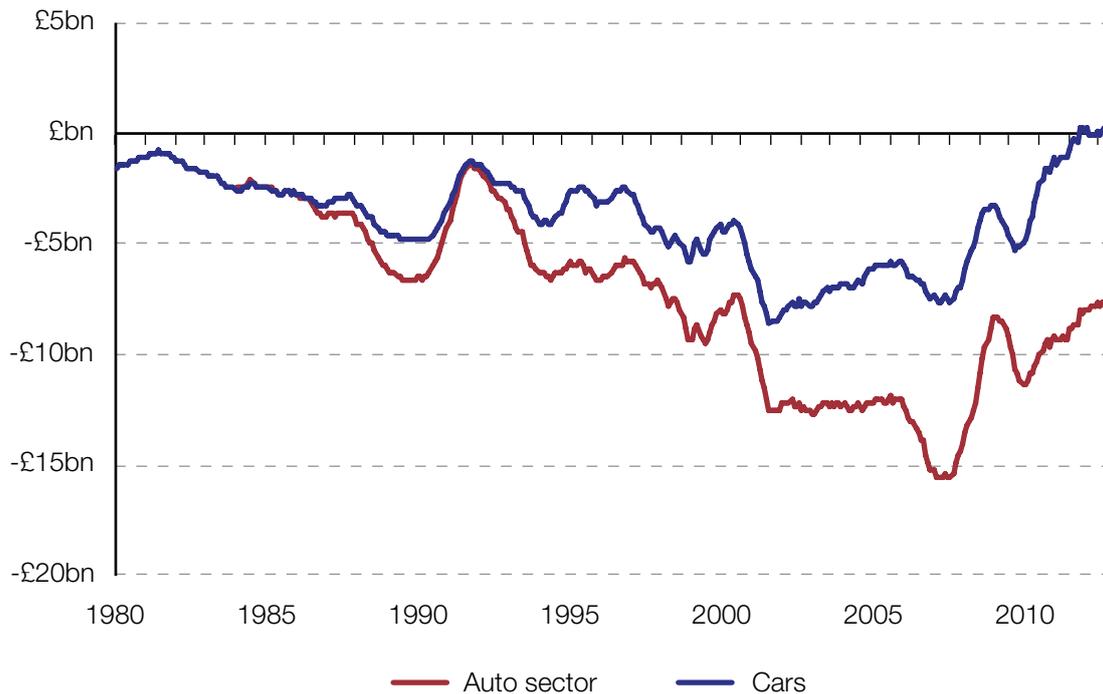
- Improving local air quality and reducing noise levels in urban areas through wider noise and emissions reduction while maintaining reduced greenhouse gas emissions
- Development of fully networked vehicles and associated services (beyond current intelligent mobility work)
- The challenges of an aging population where people wish to drive later in their lives than previously

2.49 **To determine where the UK has key strengths in future technologies, the Automotive Council will conduct analysis of the challenges and UK capability to identify technologies from within the automotive sector and in other or related sectors that could provide benefits or a competitive advantage to the UK. This will include analysis of both evolutionary and disruptive technologies.**

### 3 Enhancing supply chain competitiveness and growth

- 3.1 The UK has recently achieved a trade surplus for finished passenger cars and in fact exports about 80 per cent of all vehicles produced in the UK.<sup>24</sup> However, there remains a £6 billion trade deficit on components with a trend of increasing exports.<sup>25</sup>

Chart 3.A: UK automotive sector trade balance



Source: Trade in Goods, MRETS, Office for National Statistics, June 2013

- 3.2 In 2011 the UK automotive industry directly accounted for a total of 129,000 jobs in the UK.<sup>26</sup> Of these jobs, 63,000 were employed by the vehicle and engine makers directly, with the remainder in the immediate supply chain.<sup>27</sup>

<sup>24</sup> Motor Industry Facts 2013, Society of Motor Manufacturers and Traders, March 2013

<sup>25</sup> UK Trade in Goods by CPA (08), Q1 2013 Dataset, Office for National Statistics, June 2013

<sup>26</sup> Annual Business Survey, 2011, Office for National Statistics, 2013. Data for SIC29

<sup>27</sup> Annual Business Survey, 2011, Office for National Statistics, 2013. Data for SIC29.1

- 3.3 The direct impact of vehicle making on UK manufacturing employment is estimated to be three supply chain jobs for one vehicle/engine maker job.<sup>28</sup> Thirty six per cent of the sector's purchases are within the automotive sector.<sup>29</sup> Total UK manufacturing employment in the automotive supply chain is estimated to be between 150,000 and 200,000 jobs, with many of these jobs classified outside the automotive sector itself, in sectors such as metals, plastics, rubber and glass.<sup>30</sup>
- 3.4 There is a significant opportunity to increase UK sourcing. A survey commissioned by the Automotive Council in 2012 identified a potential additional demand of £3 billion per annum from UK based vehicle and engine manufacturers (an increase of 40 per cent over the current level of £7.4 billion UK purchases identified).<sup>31</sup> Of this additional demand, 30 per cent was for components manufactured using processes not currently available in the UK.
- 3.5 In addition, analysis of new data suggests that within Europe, the French and German transport equipment sectors source a significantly higher share of motor vehicle intermediates domestically than in the UK.<sup>32</sup> At around 40 per cent the UK is roughly in line with Spain and Italy while France and Germany source over 60 per cent of intermediates at home.
- 3.6 Whilst recent announcements of major vehicle/engine maker product investment and manufacturing growth in the UK are a positive development, it is clear that even more significant opportunities exist in the UK supply chain.
- 3.7 Chart 3.B shows the projected growth in UK manufactured vehicle volumes aligned to the likely supply chain job creation. Also displayed are the potential incremental jobs that would be created within the UK supply chain if the further £3 billion of sourcing opportunity were to be realised.



<sup>28</sup> *Growing the automotive supply chain: the road forward*, Matthias Holweg with Yung Tran, Philip Davies and Stephan Schramm, March 2011

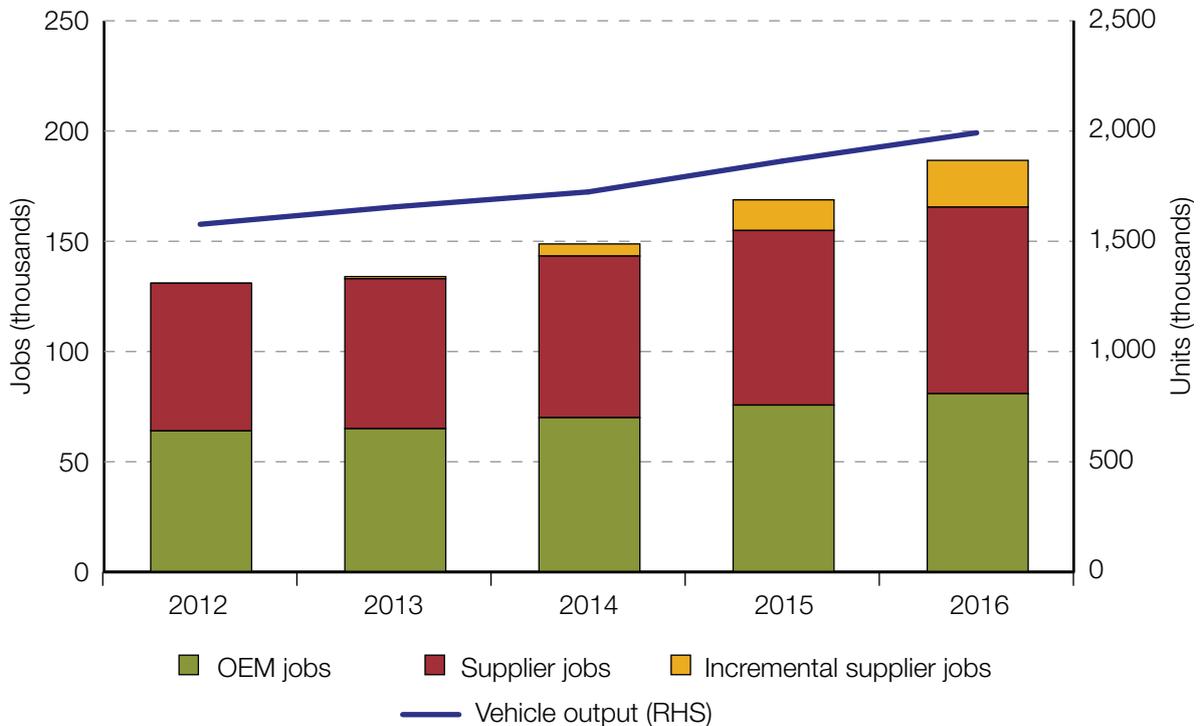
<sup>29</sup> *Growing the automotive supply chain: the road forward*, Matthias Holweg with Yung Tran, Philip Davies and Stephan Schramm, March 2011

<sup>30</sup> BIS estimate

<sup>31</sup> *Growing the UK automotive supply chain: the road forward – 2012 update*, Department for Business, Innovation and Skills, August 2012

<sup>32</sup> World Input Output Database, Groningen Growth and Development Centre, April 2012. Data for 2009. Supply to the Transport Equipment sector of 'motor vehicles, trailers and semi-trailers' products for the purpose of intermediate consumption.

Chart 3.B: Potential employment impact of growth in vehicle output and UK supply chain content

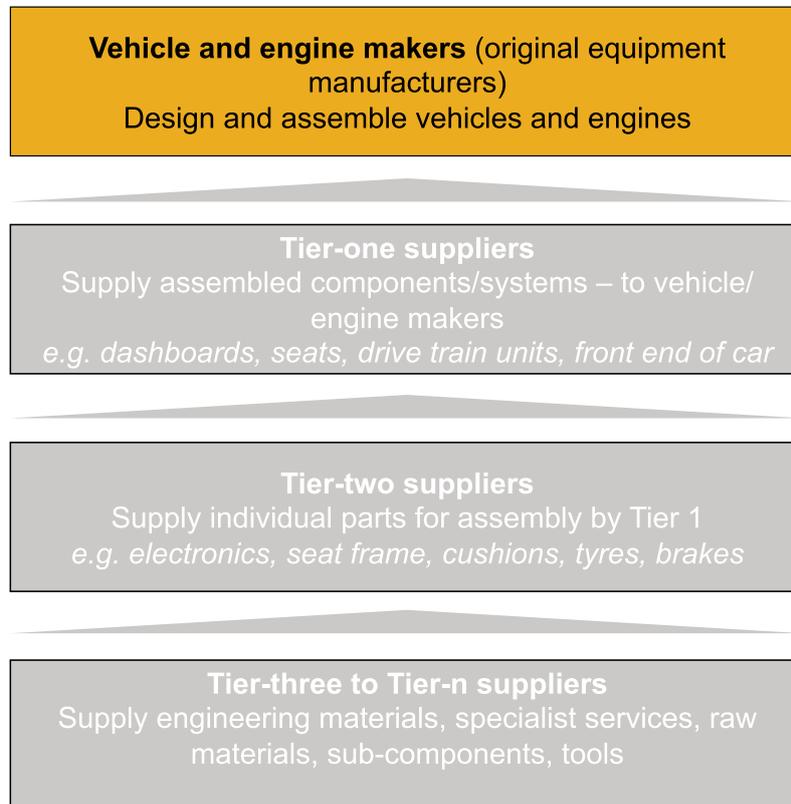


Source: *European Car and Light Commercial Vehicle Production Outlook*, SMMT, May 2013, employment BIS estimates<sup>a</sup>

<sup>a</sup> Assume jobs increase in proportion to vehicle output, with no assumption for productivity growth. Incremental supplier jobs assume UK content (by value) rises from 37 per cent in 2012 to 50 per cent in 2016

- 3.8 Evidence suggests that proximity of R&D activity stimulates further manufacturing growth and scope as product development is facilitated through improved communication and interaction. This is particularly true for businesses implementing rapid, new product introductions. However the establishment of an R&D facility rarely happens without there being a manufacturing footprint in close proximity. It is therefore important that investment in R&D in the UK supply base is needed for long-term sustainable growth.
- 3.9 Successful businesses are likely to be adding higher value through innovation resulting from their own expertise and intellectual property, naturally leading to greater export potential and high value job creation. Supply chain partnerships and vertical integration that capture as much of the value of the components that are produced is also likely to be a factor in UK success.
- 3.10 Supply chains are often more complex than they may seem. Vehicle makers rely on suppliers to provide often quite substantial assemblies that are put into vehicles on the production line. Figure 3.A gives a simplified overview of supply chain structures.

Figure 3.A: Automotive supply chain – simplified structure



## Key challenges for the supply chain

3.11 To secure supply chain growth, a clear strategic approach is required, which aligns with current strengths, whilst addressing existing weaknesses and capitalising on future opportunities. Chapter 1 summarises the key strengths, weaknesses, opportunities and threats across the UK automotive sector. For the supply chain, the particular challenges are:

- Some key capabilities and capacity are no longer available in the UK
- Supply chain SMEs are not routinely nurtured to develop their innovative and technological expertise
- Lack of UK based and owned Tier-one suppliers and under utilised capacity in Europe
- Increasing capacity and the breadth of manufacturing capabilities in line with vehicle/engine maker growth

3.12 There are a number of reasons why consideration of the UK as a location for component manufacture has become increasingly favourable:

- There is a pervasive market trend for increased customer choice driving higher product complexity. This requires leaner and more flexible supply

chains, close to the vehicle/engine manufacturing plant. This is becoming more important for all manufacturers and particularly for premium manufacturers in the UK

- The need to manage change, particularly during new product introduction
- An increased focus on reducing total delivered cost and the overall carbon footprint of the supply chain
- Greater awareness of the need for supply chain transparency and risk management (e.g. minimising effects of foreign natural disasters)
- The need to protect Intellectual Property Rights on innovations

3.13 The Government and the industry, through the Automotive Council, are seeking to enable UK automotive supply chain businesses from Tier-one to Tier-n to provide the necessary technology, breadth of capability and capacity at competitive levels of performance to make the UK an attractive manufacturing location for vehicle/engine makers whilst increasing the export of commodities and components where the UK can be globally competitive.

3.14 This requires a more pro-active approach to managing the supply base from vehicle/engine makers and Tier-one suppliers. This chapter sets out actions that the industry will take to address this, in some cases with Government help. Five priority areas have been identified for action:

- Quantifying and capitalising on the business opportunity for the UK supply chain
- Improving long term supply chain competitiveness
- Encouraging new and re-entrant suppliers to the UK and cross sector activity
- Growing UK supply chain business through increased exporting
- Improving access to finance for the supply chain
- Innovative processes for premium manufacturers

## Quantifying and capitalising on the business opportunity for the UK supply chain

3.15 The UK automotive supply chain supports a number of internationally renowned and diverse vehicle and engine manufacturers, ranging from low volume niche to high volume and premium producers. To capitalise on opportunities created by investment decisions made by vehicle and engine makers, it is essential that the supply chain investments in required key processes and technologies to support this.

3.16 During 2012, the Automotive Council published the results of an updated survey of vehicle and engine makers to identify and prioritise their aggregate demand from suppliers, by commodity, over a 5-year period. This identified more than £3 billion per annum in new demand for UK-sourced parts which has been prioritised by value. Work is continuing to understand the opportunity in sufficient granularity for plans to be developed. In parallel, numerous “Meet the Buyer” events have been organised to improve communication and understanding of the opportunities within the supply chain.



3.17 Despite these initiatives at industry level, there is no clear understanding of the opportunities in supply chain capability and capacity, and no recognised process or clear vehicle/engine maker motivation to capitalise on these opportunities using UK based manufacturing capability.

3.18 The Automotive Council has identified a number of reasons for this limited progress:

- No on-going industry level process to quantify the opportunities at a practical, granular level
- There is no existing collaborative framework for multi-lateral information sharing from vehicle/engine makers through to Tier-n to understand or address the business opportunities
- There is no compelling reason to intervene in existing sourcing patterns:
  - New business tends to be leveraged on the back of proven capabilities
  - Development of alternatives has inherent risk and generally requires resource, investment and a long-term perspective
  - Cost pressures are intensified as you go down the supply chain, reducing the ability to take a long-term perspective
  - Most vehicle/engine makers purchasing and R&D departments are based outside of the UK where there is little national interest to support the broader UK economy
  - Once business is sourced, subsequent benchmarking and change of supply is typically driven by piece part cost, rather than a broader view of competitiveness

- 3.19 To ensure that the potential supply chain business opportunities are captured in the UK, **the industry will design and implement an industry led (SMMT) framework for collating and communicating supply chain opportunities and identifying existing supplier capacity and capabilities across all tiers of the supply chain on an on-going basis.** This will include promoting the benefits of UK sourcing to parent company purchasing departments of UK based vehicle and engine makers.
- 3.20 To improve the visibility of the UK supply chain both domestically and with non-UK based vehicle and engine makers, the industry is encouraging the adoption of industry-led supplier registration programmes that when complete will provide an overview of the overall UK supply chain and its capability. This will take time to complete and in the interim the industry is seeking to use existing data sources to map the supply chain as a first step to improved information.

### Improving long-term supply chain competitiveness

- 3.21 The UK has many competent and capable first tier suppliers supporting a globally competitive industry. However, the ownership of many of these companies lies with non-UK parent companies. As a result R&D is undertaken outside of the UK. Much of the capability below Tier-one has been affected by the strength of Sterling and uncertainty around the long-term continuity of business in the UK, constraining investment in capital and skills.
- 3.22 Subsequently Tier-one to Tier-n UK suppliers have not been seen as competitive, including R&D capability, compared to offshore alternatives. Recent studies have also shown there is a misalignment between vehicle/engine maker and supplier perceptions of competitiveness. This has led to vehicle/engine makers and Tier-ones driving manufacturing offshore and UK suppliers failing to address the issues preventing business growth. This has resulted in increased supply chain risk, complexity and a long-term erosion of UK manufacturing capability.
- 3.23 Unprecedented growth and significant investment decisions by UK based vehicle/engine makers, coupled with improvements in Sterling competitiveness, offer an opportunity to rebalance UK supply chain capability at all levels. To capitalise on this unique growth opportunity, an internationally competitive business environment and taxation system that encourages long-term investment in manufacturing is required. Furthermore, a structured approach to developing the long-term competitiveness of the UK based supply chain is required.

3.24 Analysis of the reasons for this perceived lack of competitiveness reveals:

- Short term thinking and focus on piece part cost has suffocated longer-term spend on the development of supplier capabilities year-on-year, particularly in process excellence<sup>33</sup>
- Lack of functional specialism, combined with weaknesses in business and process capability impacts performance and potential growth
- A lack of understanding of true global competitiveness and the need for ambitious leadership and management capability to deliver transformational change and long-term growth

3.25 Below the top tier of the supply chain, small and medium sized businesses predominate. In common with other smaller businesses, the ability for these companies to grow is likely to be constrained. Government support for small businesses is available from the Manufacturing Advisory Service with specialist knowledge of the automotive sector. This includes advice on efficient production techniques and how to control costs, for example by making more effective use of raw materials, energy and water. In addition membership of trade bodies such as the SMMT ensures supply chain businesses can learn about key developments in the sector and opportunities for business growth and the more efficient use of resources from UK vehicle and engine makers.



3.26 Vehicle and engine makers and Tier-one suppliers are also keen to take a more pro-active role to support the development of suppliers they see as important for their future ability to source more content from the UK. To support this, [the Automotive Council working with the SMMT has developed a programme to](#)

<sup>33</sup> Piece part cost means focusing on the unit cost of each item rather than considering wider costs and risks.

preserve and develop current Tier-one to Tier-n automotive suppliers in the UK through increasing their long-term competitiveness, R&D and manufacturing capability. The industry is bidding for support in piloting this approach from the Advanced Manufacturing Supply Chain Initiative (AMSCI) with contributions from participating vehicle/engine makers and suppliers. Table 3.A sets out the key areas of focus of the development programme.

Table 3.A: Key focus areas of Automotive Council and SMMT supplier development programme

<p><b>Developing process excellence capability:</b> Engineering, design, innovation, New Product Introduction, Lean Manufacturing, Quality.</p>	<p><b>Building leadership capability</b> from Managing Director to Operational Leadership.</p>	<p><b>Building Management Capability</b> to develop and deploy vision, strategy and business plans.</p>
<p><b>Reduce Total Delivered Cost and improve supply stability</b> through an acute focus on traditional QCD performance.</p>	<p><b>Improving supply chain flexibility and complexity management</b> by increasing capability of UK sub-suppliers.</p>	<p><b>Building functional capabilities:</b> Purchasing, logistics, supply chain planning, quality management and professional marketing</p>

3.27 In addition the industry has submitted further bids to AMSCI for supplier development around supplier clusters for niche, luxury and off-road sectors. To ensure a sustainable and effective approach to developing the supply chain, the Automotive Council will investigate international best practice for support structures that enable the long-term development and growth of supply chain companies. This will adopt a broad approach and will include consideration of:

- The approach taken by vehicle/engine makers and Tier-ones in their evaluation of suppliers
- The importance placed on innovation and taking a longer term perspective
- The importance of taking a total value chain cost approach when making sourcing decisions
- How to take into account the industry's need for longer-term certainty and competitiveness in business support schemes, which is particularly important when investment planning decisions are under consideration

### Case study 3.A: Implementation of lean manufacturing at Electron Technical Solutions Ltd

Cheshire-based Electron Technical Solutions is a leading UK specialist in applying advanced paint finishes to plastic car parts. To ensure that the company could keep up with high demand from customers including Bentley, Jaguar Land Rover and Toyota, Electron sought support from the Northwest Automotive Alliance (NAA) Business Excellence programme.

The project sought to increase Electron's overall effectiveness and capacity through further lean implementation – with a view to increasing turnover to £7 million. There were particular inefficiencies during product changes and the percentage of product defects was too high.

SMMT Industry Forum was brought in to look at processes and deliver an improvement programme. Processes were standardised, and organisation of the paint line and the layout of areas were improved. The principle of continuous improvement was also applied to the team meetings which took place at the beginning of each shift, as well as to the briefing board and instructions about how the line operates.

The project has resulted in significant improvements, most notably getting processes right first time, leading to fewer defects and improved quality, less downtime, and increased productivity and capacity. This has allowed Electron to manufacture new products, such as the painting of the trim for the new 2013 model year Range Rover, in a more efficient way. The company is also on course to increase turnover as planned.



## Encouraging inward investment in the UK supply chain and creating export opportunities

- 3.28 The need for improved logistics, complexity and change management during new product introductions has already driven growth for suppliers located in close proximity to UK based vehicle/engine makers. Recently announced investments provide opportunities for more of the value chain to be UK based as critical mass is created. Further benefits from a reduced carbon footprint, reductions in other environmental impacts and risk profile enhance these opportunities.
- 3.29 Following consolidation after recent recessions, much of the capacity in the UK across a broad range of commodities has been depleted and has rapidly reached capacity as the industry has recovered.<sup>34</sup> The opportunity therefore for the UK is in overall increased supplier capacity and increases in breadth of capability, particularly in key processes that are no longer available.
- 3.30 In collaboration with the Automotive Council, UKTI held an event in December 2012 to encourage prioritised automotive suppliers not currently located in the UK to consider it as a manufacturing location. Building on the success of this event, a further event was held in July 2013.
- 3.31 Action is required to ensure that the UK capitalises on the opportunity for investment in the supply chain and associated employment growth. Global automotive suppliers do not currently see the UK as the most attractive destination for inward investment. Several reasons have been identified for this perception:
- Growth in Asia and developing regions has taken priority for scarce investment resources
  - Global automotive stakeholders are unaware of the opportunities currently in the UK
  - There is not an effective one-stop shop for assessing the regulations, planning requirements, skills support, incentives, and regional guidance available to potential investors
  - There is no cohesive industry level process for identifying priority opportunities for potential investors
  - There is insufficient understanding of the conditions and incentives necessary for the UK to be considered as an attractive destination for inward investment by automotive suppliers, compared to other global alternatives

<sup>34</sup> Automotive Council: Growing the UK Automotive Supply Chain; The Road Forward – 2012 Update

- 3.32 To provide leadership to their work with the automotive sector, UKTI is establishing a new Automotive Investment Organisation (AIO) that will take its strategic direction from the Automotive Council. The AIO will be led by Joe Greenwell the former Chairman of Ford of Britain. It will receive up to £3 million of funding from additional resources provided to UKTI at Autumn Statement 2012 and receive strategic direction from the Automotive Council.
- 3.33 The AIO will seek to leverage inward investment to deliver long-term and sustainable growth in the UK Automotive Sector. It will develop and deliver a strategy to secure the necessary inward investment including inward investment in the supply chain, build and strengthen the Government's relationships with global headquarters of existing vehicle/engine makers and potential new entrants and inward investment in R&D into the sector. It will also advocate to improve the image of the UK automotive sector among key decision makers in overseas markets, and promote the investment and trade opportunity.
- 3.34 The industry will continue to work with UKTI to market the business opportunities that have been identified in the UK automotive sector to global stakeholders. To provide additional focus for this effort, the vehicle/engine makers and the SMMT will jointly develop targeted priorities for UKTI's engagement with global automotive suppliers.



- 3.35 Government support to attract investment can be a powerful tool. The industry believes it is important that future support schemes have enough coherence and flexibility to respond to business decision-making timetables and reflect the time horizon over which investment is being made. This is especially necessary for attracting investment from major supply chain businesses that do not have an existing UK presence.
- 3.36 To improve the global competitiveness of UK advanced manufacturing supply chains, the Government has made up to £245 million available through the Advanced Manufacturing Supply Chain Initiative. Competition for support has been strong and the next round closes in October 2013. Evaluation of the initiative is already underway, and as announced in the Spending Round, there will be further rounds. An additional £185 million was also announced for the Technology Strategy Board.<sup>35</sup>
- 3.37 Building on the success of the Regional Growth Fund (RGF), the Spending Round announced £600 million of additional funding for a refocused RGF for the period from April 2015 to March 2017. This will support projects and programmes to create economic growth and sustain private sector employment. The Government is considering the scope and timings for the next round of the RGF and an announcement will be made in the autumn.
- 3.38 The industry is also concerned that actual and perceived fragmentation of the support available for businesses may deter potential investors. **The Government will work with LEPs, devolved partners and others to consider how to strengthen the existing UKTI one-stop-shop offer for inward investors. This will include considering the lessons from the model used for the offshore wind sector to encourage and support investment in automotive.**<sup>36</sup>
- 3.39 Exporting can help automotive suppliers to increase the confidence of potential domestic customers by demonstrating they can deliver to international vehicle/engine makers and Tier-one suppliers. UKTI, working with the SMMT, provides support to businesses looking to export. For example through enabling attendance at global trade shows. **The industry and UKTI will enhance their collaboration to promote UK suppliers overseas to grow volume, profile and competitiveness.**

<sup>35</sup> *Spending Round 2013*; HM Treasury, June 2013 and *Investing in Britain's future*, HM Treasury, June 2013

<sup>36</sup> *Centres for Renewable Offshore Engineering*, Department for Business, Innovation and Skills, November 2011

## Access to finance

- 3.40 Access to affordable, diverse and appropriate sources of finance has been identified as a fundamental enabler for the automotive supply industry to capitalise on automotive vehicle/engine maker growth in the UK. In particular, it is below the Tier-one level where investment funding is constrained.
- 3.41 The automotive industry and the banking sector have created a joint industry forum for improved dialogue under the leadership of the Automotive Council and the BBA. This aims to improve respective understanding of each other's needs and deliver benefits for all parties.
- 3.42 The automotive industry has historically been seen as a high risk sector by the banking industry. The automotive industry's supply chain environment is complex preventing specific needs being fully understood (particularly on financing of tooling). The recent financial crisis and subsequent contraction of the banking sector has meant that access to finance for companies, particularly for smaller companies in the lower tiers of the supply chain, has been challenging.<sup>37</sup>
- 3.43 **The Automotive Council and BBA, in conjunction with the leading banks, are committed to continuing to work together to improve mutual understanding.** The Royal Bank of Scotland (RBS) has taken a leading role in enabling this to happen and have led by example by investing in automotive sector expertise. Reflecting this leadership, RBS were invited to represent the banks on the Automotive Council.
- 3.44 **Considerable progress has already been made on tooling finance and a framework agreement has been reached to facilitate commercial discussions between vehicle/engine makers, suppliers and the banks.** Box 3.A provides more details on the tooling finance problem and the framework agreement.
- 3.45 **The Automotive Council will also work with the financial services industry to develop long-term investment finance products that meet the needs of the automotive industry, including non-bank solutions. In addition, the banks are targeting their professional mentoring services towards automotive SMEs in development of their business plans.**
- 3.46 The Government is building a new Business Bank to support finance for small and medium sized UK businesses, particularly businesses with growth potential such as those in the auto industry. This institution will bring together £2.9 billion of government resources that has already been committed to existing government schemes. It will also be deploying an additional £1 billion

<sup>37</sup> *Give them some credit! A survey of the barriers to funding the UK's automotive supply chain*, Andy Rumfitt, Smith Institute, June 2012

to support the development of diverse debt and equity finance markets for businesses and improve the provision of long term finance. Alongside the sectorally focused work of the Automotive Council and financial sector, the Business Bank will significantly improve the availability of credit and range of options available to SMEs.

### **Box 3.A: Tooling finance**

Vendor tooling is the equipment whose design and manufacture is dictated by the form and function of a vehicle/engine maker's unique component.

- It is often complex in design permitting the volume manufacture of components at high specifications with low tooling interchange costs.
- It cannot be used now or in the future to produce any other component. It is located at a supplier's site but ownership is retained by the vehicle/engine maker for the purpose of protecting supply and intellectual property.

Following an order, vehicle maker's standard terms result in suppliers purchasing tooling and then receiving payment when parts of being supplied from it. This can result in a substantial delay between having to pay the tooling manufacturer and receiving payment from the vehicle maker of up to two years in many cases. This can create a real cash flow problem for the supplier – especially those also looking to expand their businesses.

The Automotive Council has agreed a framework for the development of products to address tooling finance constraints with the financial services sector through the BBA. This sets out characteristics that would be expected from new products including arrangements for vehicle makers to pass on agreed terms through their Tier-one suppliers, commitment to pay suppliers on completion of agreed milestone events and the banks viewing the value of the transaction as the vehicle makers commitment to pay and to show willingness to provide funding into the supply chain.

Types of products could include supply chain finance, trade finance with the vehicle maker and trade finance direct to the supplier.

## **Innovative processes for premium manufacturers**

- 3.47 It is recognised that the UK premium automotive industry requires innovative manufacturing process capabilities to maintain its competitive position. Examples of these include processing of high quality and natural materials delivered with high variety and exacting quality standards. Further work is required in clearly defining what these innovative manufacturing process capabilities are, and how the UK can capitalise on them.

- 3.48 Over time vehicle/engine makers have become reliant on a number of Tier-ones who have the industrialisation capability but are predominantly owned and located outside of the UK. This is compounded by established UK owned suppliers not investing in innovation for long-term competitiveness, as they often lack an understanding of its importance or they perceive the risk/reward trade-off as unfavourable.
- 3.49 The automotive industry has not previously taken deliberate steps to understand the innovative manufacturing processes required to support its premium brands. To address this, **the Automotive Council will define the innovative business and manufacturing processes needed to support the competitive position of the premium UK automotive manufacturers.**



## 4 Investing in people – ensuring the right skills

- 4.1 A skilled workforce underpins the competitiveness of the UK's automotive sector. Developing a skilled workforce involves all parts of the education and skills system. Throughout, a focus on basic skills is key. Science, technology, engineering and mathematics (STEM subjects) provide the best grounding for a career in automotive.
- 4.2 The Government recognises the importance of producing skilled people and invests significantly in education and skills – spending £89.2 billion, or around six per cent of GDP, in 2011-12.<sup>38</sup> This investment spending compares well internationally – data from 2010 show that public spending on education and skills in the UK was 6.3 per cent of GDP, just above the OECD average of 5.8 per cent.<sup>39</sup>
- 4.3 However, the UK's performance on the attained skill level of the workforce is not strong enough internationally. Table 4.A shows that the UK trails not only western European competitors but also those elsewhere in Europe and in the major emerging economies

Table 4.A: UK's international performance on workforce skills

	Quality score			
	UK	France, Germany, Italy, Spain	Central, Eastern Europe	Brazil, Russia, India, China
<b>Skill level of workforce</b>	2.76	3.88	3.07	3.07

Source: *The competitive status of the UK automotive industry*, Matthias Holweg, 2009

- 4.4 The automotive industry needs an improved pipeline of well-qualified new entrants – direct from school or college, as apprentices doing high-quality

<sup>38</sup> *Education spending in the UK*, House of Commons Library, July 2012

<sup>39</sup> *Education at a Glance 2013*, Organisation for Economic Co-operation and Development, 2013

on-the-job training, or at graduate and postgraduate-level. At present, this pipeline narrows too early, with too much leakage at important points, producing supply issues for companies across advanced manufacturing. It is also important not to overlook the 90 per cent of the 2020 workforce who are already in work, and who need the opportunity to enhance their skills as the auto industry becomes more automated and moves towards low carbon.

- 4.5 Automotive employers are experiencing a real need for more skilled employees – but the supply chain and smaller businesses do not engage with training in a systematic enough way. Employer demand needs to drive skills provision.
- 4.6 Overall projections suggest that, across the whole economy, between 2012 and 2020 employers may need to fill up to 820,000 jobs for professional scientists, engineers and technologists (SET jobs) – 80 per cent of which are likely to be for engineers – and 450,000 SET technician jobs.<sup>40</sup> Even if these projections are at the higher end of possible demand, given the value of engineers to the economy, supply – although it can come from a complex variety of sources – is likely to be insufficient.
- 4.7 The automotive sector's need for more skilled employees is urgent. 18 per cent of establishments in the automotive sector reported vacancies, and indications are that hard to fill vacancies in the sector are above average.<sup>41</sup> Automotive sector establishments are also more likely to experience skills gaps than others elsewhere in manufacturing or across the economy as a whole.<sup>42</sup> 43,800 (42 per cent) of the current technical workforce in automotive do not hold qualifications at levels four or five.<sup>43</sup> The workforce in automotive is slightly older, on average, than in manufacturing or across the whole economy as shown in Chart 4.A. This is more pronounced in smaller companies. So the sector has a need for a growing base of new, skilled employees to replace future retirees – UKCES forecasts replacement demand of around 48,000 jobs between 2010 and 2020.<sup>44</sup>

<sup>40</sup> By the Technician Council and Royal Academy of Engineering

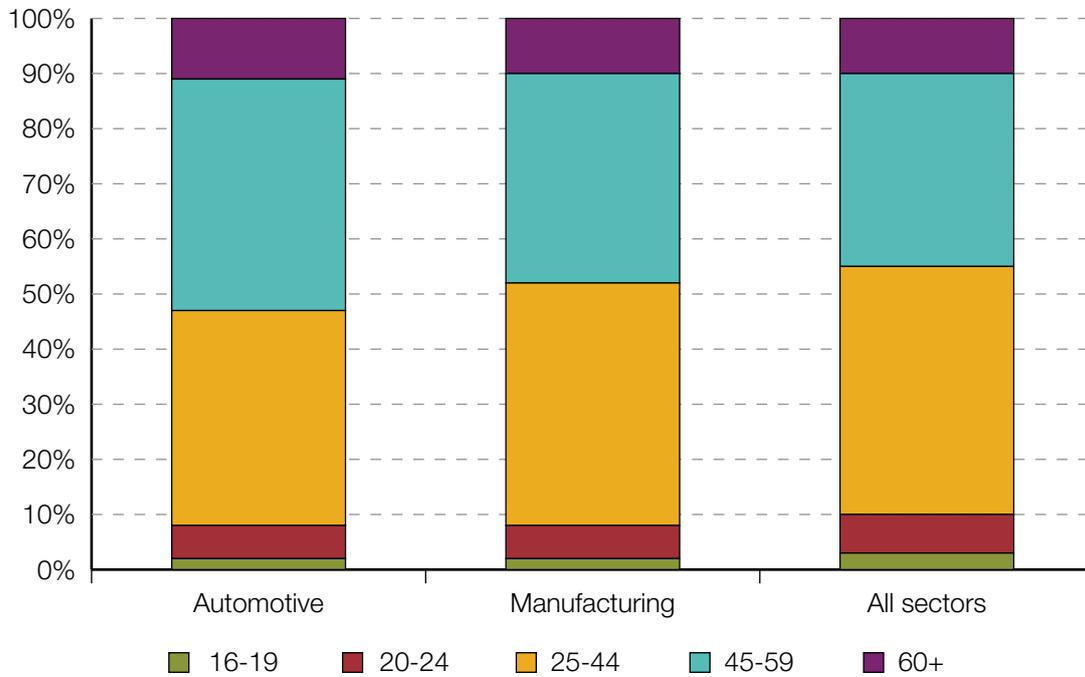
<sup>41</sup> Hard to fill vacancies are those which employers report as being difficult to fill. The majority of hard to fill vacancies are caused by a lack of skills, qualifications, experience or the right attitude offered by applicants. Other reasons include the terms and conditions of the job.

<sup>42</sup> *Employer Skills Survey*, UKCES, 2011

<sup>43</sup> Semta data, drawn from Labour Force Survey 2010. Level is equivalent to a certificate of higher education; level 5 is equivalent to a foundation degree, a diploma of higher education, or a Higher National Diploma (HND). For comparison, a full honours degree (bachelor's) is at level 6.

<sup>44</sup> *Working Futures 2010-2020*, UKCES, 2011

Chart 4.A: Employee age profiles by sector and business size



Source: Employer Skills Survey, UKCES, 2011

- 4.8 To ensure the UK workforce has the skills needed to support a growing, increasingly technology focused automotive sector, the automotive industry will work in partnership with the Government to address urgent skills needs and develop a comprehensive talent pipeline for the sector.

## Developing a pipeline of skilled people

- 4.9 Jobs in the automotive sector require solid literacy and numeracy, good passes at GCSE level, and a pipeline of people qualified in STEM subjects. Developing this pipeline is a responsibility shared by government and industry, and it covers the whole education and skills spectrum, from primary school level, continuing throughout secondary school and into college, work-based training or university, and then on into the workplace.
- 4.10 The UK's formal education system is not as strong as it needs to be at producing people with the skills needed to work in the automotive sector. International data show that the reading, maths and science performance of 15 year olds in the UK has stagnated in recent years. According to the OECD Programme for International Student Assessment (PISA), the UK ranks around average amongst OECD countries for attainment in reading and mathematics and above average for science – the UK's relative performance has decreased as other countries have improved and higher performing countries have entered the study. Analysis of the most recent PISA study for 2009 found that

fifteen year-olds in England were, on average, at least six months behind their peers in seven countries in reading, thirteen countries in maths, and six countries in science.<sup>45</sup>

- 4.11 Data shows that, in the most recent GCSE cohort, 59 per cent of pupils achieved five or more A\*-Cs including English and maths.<sup>46</sup> However, other research has shown that, on average, a smaller proportion gains qualifications that allow progression to STEM A levels – around half of the cohort in 2012.<sup>47</sup>
- 4.12 Entries for STEM subjects at A-level are picking up – in 2012, up three per cent on 2011 and 29 per cent since 2007. This follows a long period of decline, however, and so it is crucial that government policy allows the recent positive trends to be maintained.
- 4.13 Overall, the pipeline of people skilled for automotive jobs narrows too early, and means that the available pool of potential qualified employees for companies in the automotive sector is smaller than it could be. See Figure 4.A.

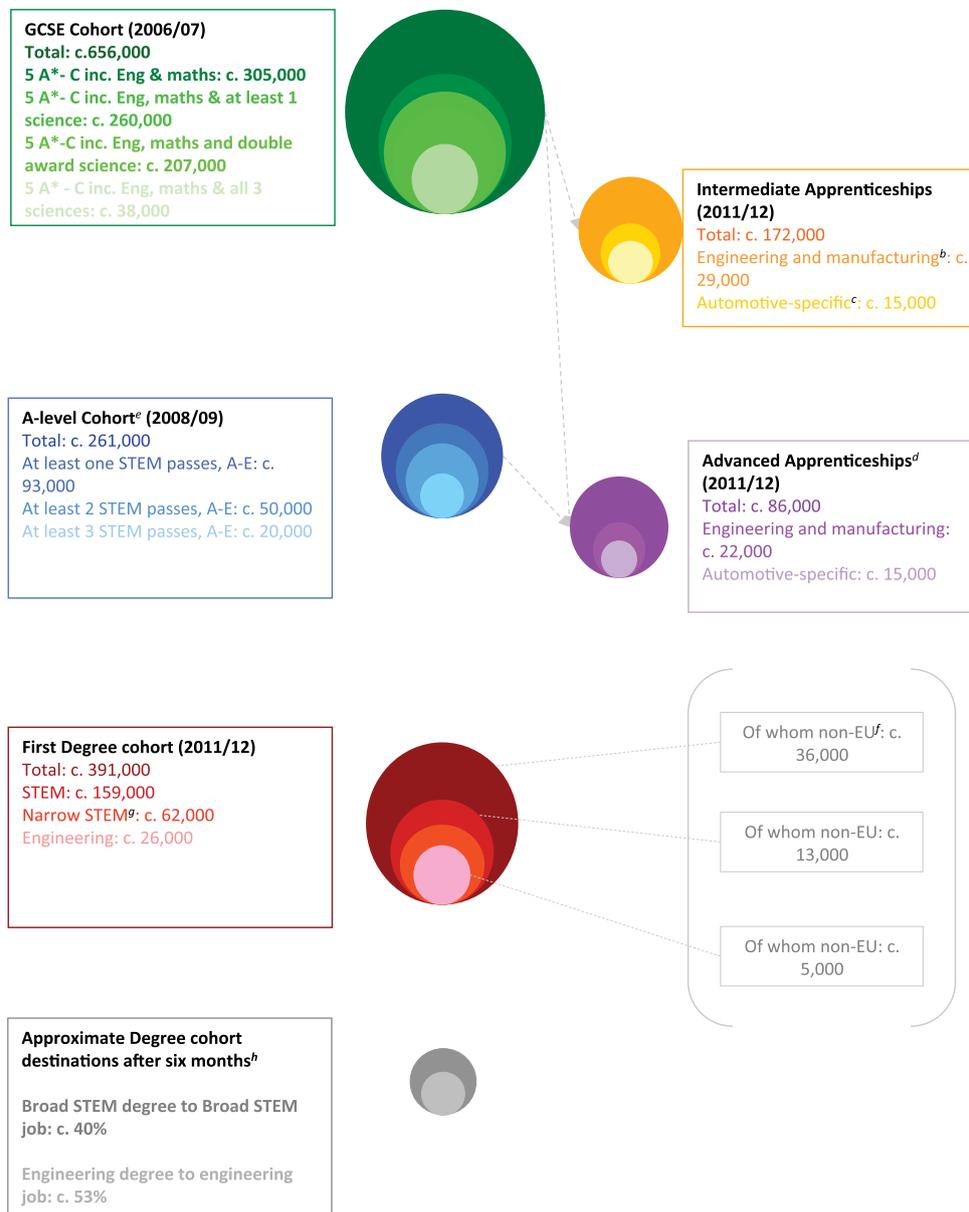


<sup>45</sup> *PISA 2009 Study: How big is the gap? A comparison of pupil attainment in England with the top-performing countries*, Department for Education, October 2011

<sup>46</sup> *Revised GCSE and equivalent results in England: academic year 2011 to 2012*, Department for Education, January 2013

<sup>47</sup> *Opportunity or Ability? Key Stage 4 science and Mathematics participation and attainment in England 2010*, Education for Engineering, August 2012

Figure 4.A: STEM subject pipeline<sup>a</sup>



**Notes:** Bubble sizes are approximate, not exact. See below for more detailed notes.

Notes: Bubble sizes are approximate, not exact.

- By looking at results over time a single cohort going through the education system has been approximated. There are imperfections in this approach; people enter higher parts of the system from other routes than the 2006-07 GCSE cohort. This should have only marginal effects on the data
- BIS compilation of Apprenticeships data based upon The Data Service UK framework guidance (see also for Advanced Apprenticeships).
- BIS compilation of Apprenticeships data based upon SEMTA framework guidance (see also for Advanced Apprenticeships).
- BIS compilation of advanced and higher apprenticeships data. Higher apprenticeships were not yet well established in 2011-12 so are assumed to be zero for the sake of this illustration
- DfE analysis of attainment data based upon BIS “narrow” specification of STEM at A-level (maths, physics, chemistry and biology)
- Approximation of first degrees non-EU student cohort for all first degrees data, based upon Higher Education Statistics Agency data for all undergraduates (which include foundation and other degrees).
- To narrow STEM to more closely fit the likely needs of automotive, medical, biological, agriculture and architecture-related degrees are excluded.
- BIS Approximations based upon Destinations of Leavers from Higher Education data for 2010-11 cohort. Destinations of those who are in work after six months, job classification to STEM and engineering is approximate.

4.14 At all levels of the pipeline, females are less well-represented than males. For the past 20 years or more, the proportion of girls doing physics A level has stayed constant at around 20 per cent.<sup>48</sup> In 2011-12, around 4,300 females gained an undergraduate degree in engineering and technology, compared to more than 26,000 males.<sup>49</sup> Since there is less participation, the overall supply of qualified people is reduced.



4.15 **The Government recognises the challenges posed by the weak pipeline for STEM subjects, and is taking steps to increase the number of young people moving through it.** In particular, the Government is focusing on maths and science in schools to ensure that there is a well-equipped future workforce in high demand sectors such as manufacturing, engineering and construction. This includes: enhanced incentives for well-qualified people to train to teach STEM subjects, the inclusion of science and maths in the new English Baccalaureate and reforming the content of qualifications to ensure they meet world-class standards.

4.16 A new curriculum will be introduced at both primary and secondary levels which will build firm foundations and secure a deep knowledge and understanding of a subject from primary school through to GCSE. For example, the new computing curriculum will focus far more on computer science elements and programming rather than purely on digital literacy. These represent positive moves towards equipping young people with the skills needed to flourish in careers in manufacturing generally or in automotive specifically.

4.17 The Government has implemented recommendations of the Wolf Review of Vocational Education to identify and provide incentives for schools and colleges to offer high quality vocational qualifications to 14-19 year olds. Pupils who started their final phase of secondary education in September 2012 are benefitting from the Government's reforms, which incentivise high-value vocational qualifications for 14-16 year olds. 140 non-GCSE qualifications met the required standards for inclusion in the 2014 performance tables including nine high quality engineering qualifications and 118 met more rigorous

<sup>48</sup> *It's Different For Girls*, Institute of Physics, 2012

<sup>49</sup> *Higher education student enrolments and qualifications obtained at higher education institutions in the united kingdom for the academic year 2011-12*, SFR183, Higher Education Statistics Agency, January 2013

standards required for inclusion in 2015 with 11 engineering qualifications recognised. The Department for Education is encouraging awarding organisations to submit qualifications in sectors under-represented in performance tables, including engineering and manufacturing. The Royal Academy of Engineering is working with an awarding organisation to develop three new engineering Level two qualifications expected to be available from 2014.<sup>50</sup> In addition, the Department for Education has recently consulted on proposals to establish rigorous standards for Level three vocational qualifications in schools and colleges and in autumn 2013, the Government will publish a list of high value 16-19 vocational qualifications to be updated annually.

- 4.18 The Government's response to the Richard Review of Apprenticeships includes common principles to drive up quality and increase employer engagement with the design, delivery and assessment of vocational qualifications and apprenticeships. The Government has set out a commitment to place control of apprenticeships more firmly in the hands of employers, and ensure all apprenticeships are rigorous and responsive to employers' needs. The automotive industry welcomes this commitment, and will continue to design high-quality Apprenticeship frameworks and be an exemplar sector for the delivery of work-based training and skills.
- 4.19 Education and skills policy is devolved to Scotland, Wales and Northern Ireland. The governments in those administrations are similarly making interventions to strengthen the STEM pipeline.

## A framework for automotive sector skills

- 4.20 There is wide agreement in the automotive industry that, to realise the sector's overall vision, there is a need for a clear framework and infrastructure for skills in the automotive sector.
- 4.21 The lack of such a framework is holding the sector back from making best use of public and private investment in the skills needed to support its growth. The skills development framework available to the automotive sector is considered to be fairly comprehensive and of high quality by large automotive employers. Robust training is available to support employees at all levels in the workforce.

<sup>50</sup> Qualifications are described in terms of Qualification and Curriculum Framework (QCF) levels, which allows the comparison of different qualifications of equal difficulty. As a guide, level one is equivalent to GCSEs below grade C; level two is equivalent to GCSEs at A\* - C; level three is equivalent to A levels; level six is equivalent to a full bachelor's honours degree; level seven is equivalent to a master's degree. Note too that qualifications can be of different size, even when they are at the same level. More information can be found at [www.ofqual.gov.uk](http://www.ofqual.gov.uk)

Figure 4.B: Qualifications and job roles by level

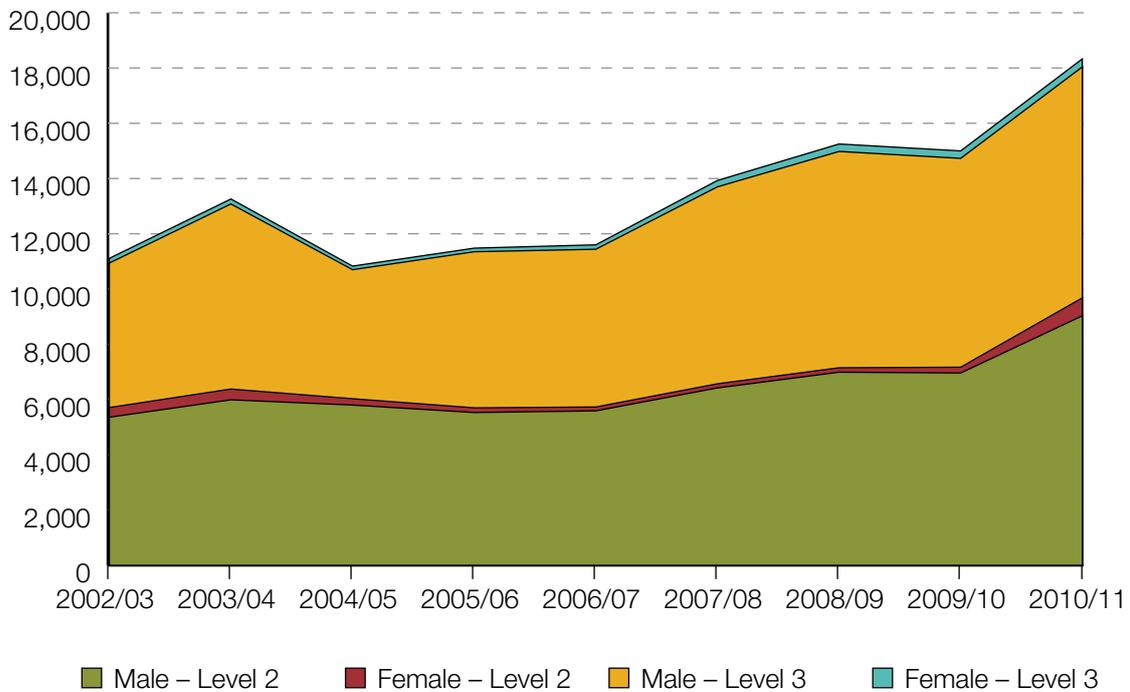
	Example qualifications	Example job roles
<b>Level 1</b>	Skills for Life basic literacy and numeracy	[few job roles in the automotive sector are at level 1]
<b>Level 2</b>	Apprenticeships – at operator and semi-skilled level Business improvement techniques Lean	Mechanical Maintenance Fitter; Metal working and machine operatives; Quality Control (batch work); Manufacturing Process Operator; Maintenance Operator; Materials Handler
<b>Level 3</b>	Advanced Apprenticeships – at craft and technician level	Toolmaker; Composite technician; Electrical maintenance technician; Technical support engineer; Electrical design engineer; Motorsport technician; Engineering project manager
<b>Levels 4, 5 &amp; 6</b>	Higher Apprenticeships Bachelors' Degrees HNDs / HNCs Foundation Degrees	Manufacturing Senior Technician; Senior Controls Technician (Mechanical Testing); Senior Electronics Production Technician; Automotive Senior Technician

Source: Senta apprenticeship frameworks relevant to careers in automotive.

- 4.22 Recent years have seen a positive increase in the quality and quantity of Apprenticeships, which provide a valuable work-based route into jobs in the automotive sector. However, the framework has not gained the coherence or the pan-sectoral buy-in to effect the step-change in skills that is needed to protect the UK's competitive advantage.
- 4.23 The manufacturing sector overall is keen to engage more actively with Apprenticeships. Although only 18 per cent of manufacturing employers currently provide Apprenticeships, 43 per cent plan to do so in future. The respective figures for the UK as a whole are 13 per cent and 32 per cent.<sup>51</sup>
- 4.24 Take-up of automotive-relevant apprenticeships has been increasing in recent years (see Chart 4.B) – but is not producing sufficient levels of qualified people.

<sup>51</sup> Employer Perspectives Survey, UKCES, 2012

Chart 4.B: Engineering apprenticeship starts, 2002-03 – 2010-11

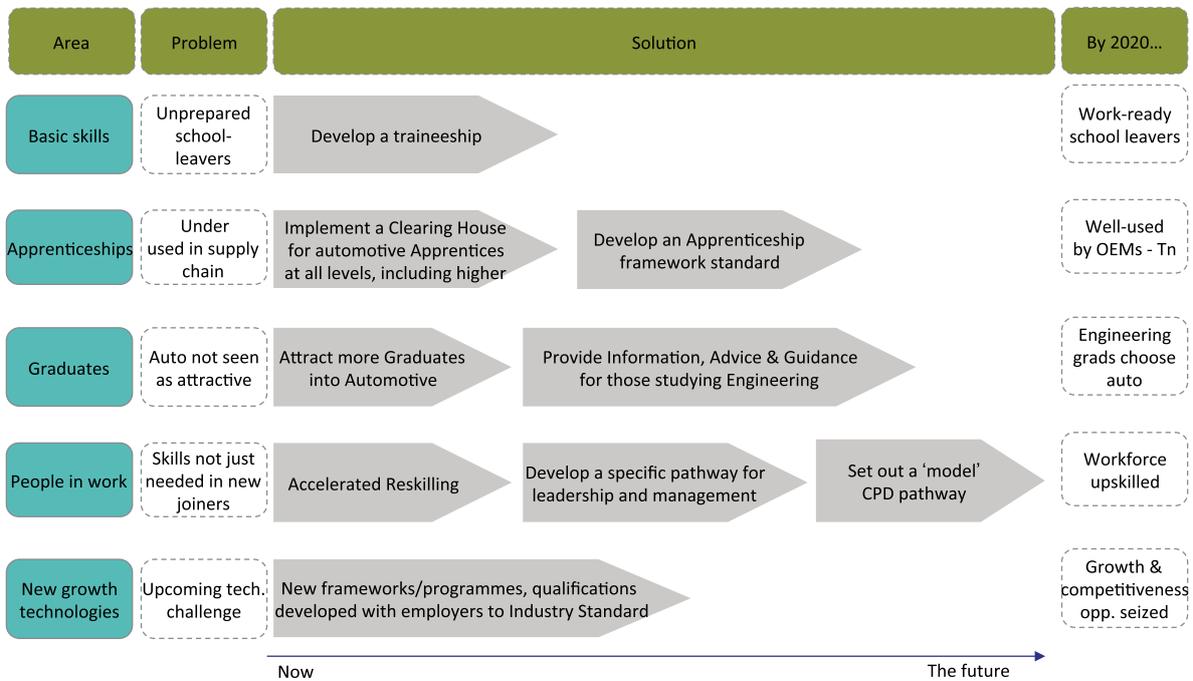


Source: Apprenticeship starts by framework, level and gender, Skills Funding Agency, April 2013. Data for 2011-12 are not comparable with earlier years and are not shown.

- 4.25 Overall, the current skills development framework – while offering good quality – has neither the coherence nor the traction to help automotive employers recruit and train the employees they need.
- 4.26 To address this need, industry and the Government have worked together on a draft consensus skills roadmap. This sets out the skills needs of the automotive sector, from now into the future, along with the industry-agreed pathways to meet them. It fits neatly with the new detailed consensus technology roadmaps which will be published by the end of 2013. **Through the Automotive Council, the Government and the industry will adopt this roadmap as the framework for addressing the sector's skills needs, and will continue to develop and implement it over time.**



Figure 4.C: Draft consensus skills roadmap



4.27 The skills framework addressed in the roadmap above will be of most use if it can be made available – easily, and without hassle – throughout the automotive supply chain. These are the companies who find it hardest to engage with training now, and yet whose skilled workforce underpins the competitiveness of the UK's vehicle producers. Automotive employers do not find it easy to conduct training or recruit people with high level skills. Only five per cent of automotive employers recruited a graduate from higher education over the last two to three years compared to seven per cent in manufacturing and ten per cent on average for the UK.<sup>52</sup>

4.28 Although a higher proportion of automotive employers provide employees with training (compared to manufacturing and all sectors), a much lower proportion of staff in the automotive sector receive training and each trainee receives considerably fewer days training on average.<sup>53</sup> This suggests that although employers are active trainers the training provided may be more light-touch and not of sufficient quality or duration. In addition, management skills in manufacturing are generally weak by UK and international standards.<sup>54</sup> The skills roadmap described above recognises this weakness, and includes action to develop a pathway to improve leadership and management capabilities, especially in the supply chain.

<sup>52</sup> UK Employer Skills Survey 2011, UKCES, 2012

<sup>53</sup> UK Employer Skills Survey 2011, UKCES, 2012

<sup>54</sup> Sector Skills Insight Advanced Manufacturing, UKCES, 2012

- 4.29 A variety of barriers prevent or deter employers from investing in training, including: inability to source from local providers the standard of engineering courses required; access to finance to support the often significant upfront costs of training; and, in small and medium-sized businesses, the lack of human resources support. Some employers consider recruiting skilled people to be less complicated and resource intensive than training their own workforce; however, this approach does not serve the interests of the sector as a whole and can be counter-productive in harming firms within the same supply chain.
- 4.30 The share of establishments in the sector that have a training plan is equal to the all-sector average for the UK (38 per cent). However, the share of automotive establishments that have a training budget (with which to implement that plan) is 24 per cent, much lower than the UK average (29 per cent). This suggests lack of money for training is a barrier or that the benefits of training are seen as less attractive than other options. Retention of skilled employees once trained is seen as a problem. Overall, research by UKCES suggests that there are substantial differences in training behaviour between the largest manufacturers and the SMEs. On a number of training activity indicators SMEs in manufacturing lag the UK average for their size, often by some distance. By contrast, large manufacturing firms perform close to or above the UK average on the same indicators.<sup>55</sup> There is also a relative absence of graduate recruitment in the manufacturing sector compared to the UK average for each firm size,<sup>56</sup> and across the economy, the likelihood of offering a formal apprenticeship increases with the size of a firm (UK averages).<sup>57</sup>
- 4.31 Larger companies face fewer barriers to engaging with training. The Automotive Council and its sub-groups draw their industry membership primarily from these larger companies. Those members **expect to recruit more than 7,600 Apprentices and 1,700 graduates over the next five years.**
- 4.32 Addressing the challenges in the automotive skills pipeline will require a new degree of collaboration between companies in the sector to own those parts of the skills agenda that will benefit all automotive companies and their employees. This view is in strong alignment with the Government's stated aim to make the skills system more responsive to the needs of that business. In that context, with the support of the Automotive Council the industry has developed a proposed industrial partnership for automotive skills. This would assist the process of employers in the sector collaborating on skills and taking

<sup>55</sup> *UK Employer Skills Survey 2011*, UKCES, 2012. Note that, because of small base sizes, data is only available at manufacturing level and not for the automotive sector specifically.

<sup>56</sup> *UK Employer Skills Survey 2011*, UKCES, 2012

<sup>57</sup> *Employer Perspectives Survey*, UKCES, 2012

ownership of the agenda and would link directly to the strategic leadership of the sector. **Jaguar Land Rover has, on behalf of and with the support of the wider sector, submitted an outline bid to the second round of the Employer Ownership Pilot** to seek government co-investment in this industrial partnership.

## Encouraging young people to work in automotive

4.33 There is a need to build awareness of careers in the automotive industry among young people (particularly girls and young women, who are especially under-represented), their teachers and their parents. Part of the early narrowing of the funnel is driven by young people's views of careers available in STEM industries. The automotive industry is driving positive engagement through a variety of programmes aimed at raising the profile of the sector and encouraging young people to study science subjects. Notably, **automotive was a founding sector for the successful See Inside Manufacturing programme, and is committed to continuing to work with the Government on the next phase.**

4.34 A wide range of initiatives already exists to raise the profile of the sector, and companies of all sizes across the automotive sector engage actively with them. It can be hard, however, to engage young people – especially for smaller companies. Working through the industrial partnership described above, vehicle manufacturers plan to look to streamline the information, advice and guidance offering as it relates to automotive, and to ensure it is straightforward for both schools and smaller companies to access.



## Case study 4.A: Jaguar Land Rover – Inspiring Tomorrow's Engineers

As a leading investor in UK R&D, JLR believes it critical to encourage talented young people to become the next generation of engineers and technologists to sustain its business and its supply over the long term. The company's 'Inspiring Tomorrow's Engineers' (ITE) programme is designed to do just that in collaboration with schools and colleges by promoting learning and engagement on STEM (science, technology, engineering and maths) subjects.

Jaguar Land Rover Group Chief Engineer, Bob Joyce explains: "At Jaguar Land Rover we firmly believe that our future prosperity lies in innovation, engineering and the application of science. I believe the challenges the car industry faces over the next 20 years make it the best time for almost a century to be an automotive engineer. The world is looking to us to make personal mobility more sustainable and we can only do that through engineering and science."

Jaguar Land Rover runs five Education Business Partnership Centres at each of its sites in partnership with local education authorities, education charities and academic institutions. Over 22,000 students from local schools visit the centres each year with their teachers to learn about engineering, manufacturing and automotive business-related activities. Teachers either use the facilities to complement their own courses or use tailor-made courses prepared by the centres.

Jaguar Land Rover has also worked in conjunction with other automotive, engineering and academic organisations to develop a series of national school challenge projects for schools, such as 4x4 in Schools and GT in Schools. These help to bring science and technology subjects to life, providing over 170,000 pupils with hands-on projects that enable them to explore different aspects of the automotive industry in a stimulating and exciting way. In addition to raising awareness about engineering and automotive technologies, the projects also help young people develop communication, team-work, project management and ICT skills.

Together with the outreach work of its apprentices, graduate entries and support to other schools, Jaguar Land Rover engages every year with well over 200,000 school children through its Inspiring Tomorrow's Engineers Programme.

## Case study 4.B: Engaging with schools

In July 2012 Aston Martin opened its global headquarters in Gaydon to students and teachers from Aylesford School and Sixth Form College in Warwick. Students were shown around the facilities which comprises offices, an adjoining production facility and a state-of-the-art design studio.



The activity was part of ‘See Inside Manufacturing’ programme supported by the Automotive Council and the Department for Business Innovation and Skills (BIS) to promote the image of manufacturing to young people.

After the visit Steve Martindale, Head of Design Technology at Aylesford School & Sixth Form College, spoke of the impression it had made on students and teachers:

“We had an amazing trip to Aston Martin. We were treated to a truly unique experience, with our VIP passes, the students were able to experience the manufacturing facility, testing areas, training academy and the One-77 facility to show us the last of the £1.2 million cars being complete. The students got to see the latest car being built, and sat in the current range. One of Aston Martin’s directors inspired the students with a Q&A session where he spent over forty minutes fielding questions. Technicians from manufacturing stopped to explain their jobs and show examples of parts and processes. During lunch the students were able to chat informally with the current apprentices gaining an understanding of the selection process and careers within Aston Martin. After a lunch break the students were shown new skills and had the opportunity to make themselves a memento in the training academy. I believe the opportunity to inspire our students is so valuable and it will hugely benefit them. If the passion for excellence and ‘never give up’ attitude could be instilled into all our students I think they will become more motivated, harder working and see the reasons to be successful. The factory visit itself was hugely valuable giving our students true understanding and reinforcing those subjects taught theoretically. The fact it was such a prestigious brand and showed excellence in all facets of its work added to the experience.”

As a result of the visit one of the students successfully enrolled to become an apprentice at Aston Martin.

### Case study 4.C: Automotive companies are already engaging with University Technical Colleges

University Technical Colleges (UTCs) are Academies for 14-19-year-olds. They focus on providing technical education that meets the needs of modern business with students spending around 60 per cent of their time on core academic subjects, and the rest of their time learning specific technical skills and qualifications. The involvement of universities and employers means that students benefit from work placements, guest speakers, and a curriculum designed by experts in the field.

The first UTC, the JCB academy, opened in 2010 with 270 students across Years 10 and 12, and number of manufacturing partners including Toyota and Bentley. A Jaguar Land Rover supported UTC opened in Aston in 2012 and the Automotive sector are planning to act as partners in 5 further UTCs opening in 2013 and 2014 in East London (Ford), Derby and Burton (Toyota) and at Silverstone (Motorsport companies) and Warwick (Jaguar Land Rover).

- 4.35 **To enhance the effectiveness of these interventions, the automotive industry will consider a coordination umbrella that will bring together careers information, advice and guidance (CEIAG) that encourages young people to choose careers in the automotive sector.** Drawing on best practice from across the spectrum of CEIAG provided by the public, private and third sectors, this umbrella might cover a high quality information, advice and guidance framework, with visual aids and presentational materials that support and enable SMEs to engage with local schools more. And it will further encourage young employees to visit schools to share their experiences of working in the automotive sector. In creating this umbrella, the Automotive Council will consider ways to use its own branding to build the image of careers in the sector and should provide promotional material to facilitate automotive companies (of all sizes) engaging with their local school.

### Getting graduates and postgraduates into the automotive sector

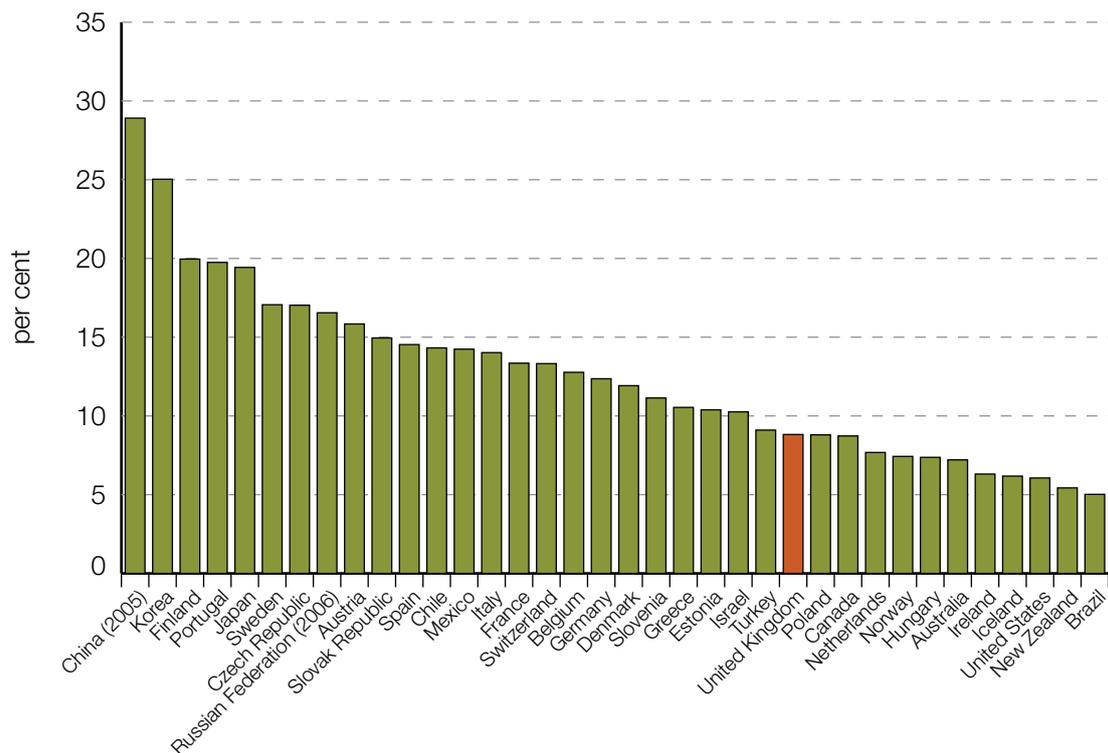
- 4.36 The Royal Academy of Engineering have forecast the UK economy as a whole will require 820,000 new professional (a proxy for graduate and postgraduate-level) scientists, engineers and technologists (SET) between 2010 and 2020.<sup>58</sup> Of these, between 70 and 90 per cent are expected to be engineers. Around

<sup>58</sup> *Jobs and growth: the importance of engineering skills to the UK economy*, Royal Academy of Engineering, September 2012. The report also forecasts demand over the same period for 450,000 SET technicians (below degree-level).

450,000 SET technicians (below graduate-level) are expected to be needed over the same period.

- 4.37 In automotive specifically, much of the forecast growth of the sector will be at the high-skill end, for which graduates and postgraduates are a key source of expertise and knowledge. Enrolments on STEM degrees have increased significantly – by 27 per cent between 2002-03 and 2009-10. In the same period, STEM degree achievements increased by 36 per cent, as compared to a 27 per cent increase in non-STEM degrees.
- 4.38 The UK is at the lower end of the distribution for SET degree holders for countries monitored by the OECD. Chart 4.C shows that the UK was placed behind Germany, Spain and China for engineering degrees as a proportion of new degrees.

Chart 4.C: Share of engineering degrees in total new degrees 2007



Source: Science, Technology and Industry Outlook, OECD, 2010

- 4.39 In 2011-12, just over 307,000 students gained an undergraduate or postgraduate degree in a STEM subject from UK universities. Just over 50,000 of these received their degree in engineering or technology.<sup>59</sup> Recent longitudinal data shows that, three and a half years after graduation, 74 per

<sup>59</sup> BIS analysis, drawing from Higher Education Statistics Agency student record data

cent of people who did engineering and technology degrees tend to be in STEM employment, compared to 72 per cent for STEM as a whole.<sup>60</sup>

- 4.40 In any year a proportion of those graduating will be from overseas including from countries outside EU. Non-EU students are less likely to be available to join the UK workforce. In 2011-12, 36 per cent of students gaining an engineering degree at undergraduate or postgraduate level were from non-EU countries – as compared to 16 per cent across all STEM disciplines.<sup>61</sup> Although it is not as straightforward as recruiting STEM-proficient graduates from the UK or the EU, many automotive companies need to recruit from abroad because domestic supply is not strong enough.
- 4.41 Automotive employers – especially those in the supply chain – report difficulties in recruiting the graduate and postgraduate talent that they need. **The Government and industry recognise the importance of working together to improve the quality and quantity of graduates coming in to automotive.** More broadly, BIS's Chief Scientific Adviser, Professor John Perkins, will report on engineering skills in the UK. The automotive sector will engage with his findings.
- 4.42 Graduates and postgraduates are also included in the skills roadmap and the industrial partnership bid described above. In addition, **the Government and industry will collaborate to seek ways to ensure that talented people are attracted into automotive-relevant courses at undergraduate and postgraduate level.** This includes:
- An immediate **commitment from industry to create an Automotive Council scholarship scheme**, where promising university students are sponsored through industry-relevant degrees by individual companies but under the auspices of the Council.
  - **The Government and industry will explore options to widen the availability of the modular Masters Advanced Skills Accreditation Scheme** and to give it Automotive Council endorsement.
  - **A commitment from top executives from the industry to personally engage with schools and their students.**
- 4.43 The Automotive Council recognises the long-term strategic skills challenge that the sector faces, and is committed – as a body and as individual members – to tackling it. This will require concerted effort from the both industry autonomously, and working in close partnership with government, trade bodies, professional bodies and skills experts.

<sup>60</sup> *Longitudinal Destinations of Leavers from Higher Education*, Higher Education Statistics Agency, 2013. See also *The Supply of and Demand for High Level STEM skills*, UKCES, 2011.

<sup>61</sup> BIS analysis, drawing from Higher Education Statistics Agency student record data

## 5 A business environment that enables a competitive automotive industry

- 5.1 The UK has significant strengths as a competitive location to run a business – and this benefits the automotive sector. Over the past decades the UK has been able to attract significant investment by global vehicle manufacturers and Tier-ones, creating and sustaining a diverse and truly global automotive industry in the UK.
- 5.2 For automotive investors, however, with many under foreign ownership, the challenge is to ensure that the key elements of the UK and EU business environment that support investment and growth in automotive and advanced manufacturing are strengthened and secured for the long-term. This supports the competitiveness of UK plants and helps influence investment decisions in favour of UK locations.

### A business environment to support manufacturing

- 5.3 The UK consistently ranks as a good place to do business. The World Economic Forum ranks the UK as the eighth most competitive business environment and the World Bank places the UK as the seventh best place in the world for doing business.<sup>62</sup> However such aggregate rankings do not necessarily reflect the UK's manufacturing strengths – they are a broad assessment of the UK. However, substantial investment by global car companies suggests that the UK is a relatively competitive location for manufacturing. Analysis of trade data shows the UK has a comparative advantage in certain high end manufactures and suggests no comparative disadvantage in the broad transport equipment sector.<sup>63</sup>
- 5.4 Key factors of the UK's business environment include:
- A commitment to global free trade which, coupled with membership of the largest single market in the world, means that the UK is an attractive location for automotive production and for exporting around the world
  - A flexible workforce that allows companies to expand and innovate quickly<sup>64</sup>

<sup>62</sup> *Global Competitiveness Report*, World Economic Forum, 2012-13 and *Doing business*, World Bank, 2013

<sup>63</sup> BIS Economics Paper No.19 "Benchmarking UK competitiveness in the global economy" (2012)

<sup>64</sup> *Global Competitiveness Report*, World Economic Forum, 2012-13

- The most competitive business tax regime of the major European economies<sup>65</sup>
  - World leading technology and design including some promising ultra-low carbon technologies, and four of the top 10 universities in the world<sup>66</sup>
- 5.5 This attractive business environment supports a growing automotive sector, a major contributor to the UK economy. Vehicle and engine makers committed to invest £6 billion between 2010 and 2012. This has included announcements by Jaguar Land Rover, Nissan, Toyota, Ford, JCB, BMW and others.<sup>67</sup>
- 5.6 But there are significant competitive challenges ahead if the UK wants to rebalance its economy with a business environment that supports manufacturing. This requires consideration of the impact on investment and competitiveness of the support available through the tax system and elsewhere for R&D and capital investment. It also needs a pro-active focus on the costs of doing business for advanced manufacturing – especially at scale. This includes, for example, ensuring that the UK remains competitive on energy costs, and property costs including local taxes such as Business Rates.
- 5.7 The automotive sector has benefitted from significant Government support linked to recent investment. One challenge for automotive investors is to match the nature and availability of support schemes with both the timing of investment decisions and the time horizon that automotive investors consider. This can be 10 years or more where significant fixed capital investment is required.

## Improving the attractiveness of the UK as a place to invest

- 5.8 In recent years, the Government has pro-actively set out a positive pro-manufacturing message. A successful manufacturing sector – with automotive at its heart – is a key mechanism to achieve the ambition to re-balance the UK economy away from the South East and an over reliance on a small number of sectors.
- 5.9 The Government has committed over £316 million to automotive sector projects through the Regional Growth Fund (RGF), almost £80 million of public and private investment through the Advanced Manufacturing Supply Chain Initiative (AMSCI) and over £180 million to support collaborative R&D through the Technology Strategy Board. With industry, through the Automotive Council, the Government has focused on intensive relationship building with key

<sup>65</sup> *Capturing Opportunity*, KPMG, September 2012

<sup>66</sup> *World University Rankings*, QS, 2012. Other rankings give the UK fewer top 10 universities.

<sup>67</sup> *Recent investment announcements from UK automotive companies*, SMMT website, [www.smmmt.co.uk/investment](http://www.smmmt.co.uk/investment). Checked 5 June 2013.

decision makers. This includes UKTI support to encourage investment in the UK.

- 5.10 To support the development of this strategy, the Automotive Council established a new Business Environment working group. **To ensure the focus on the UK's competitive position for automotive continues, the Business Environment group**



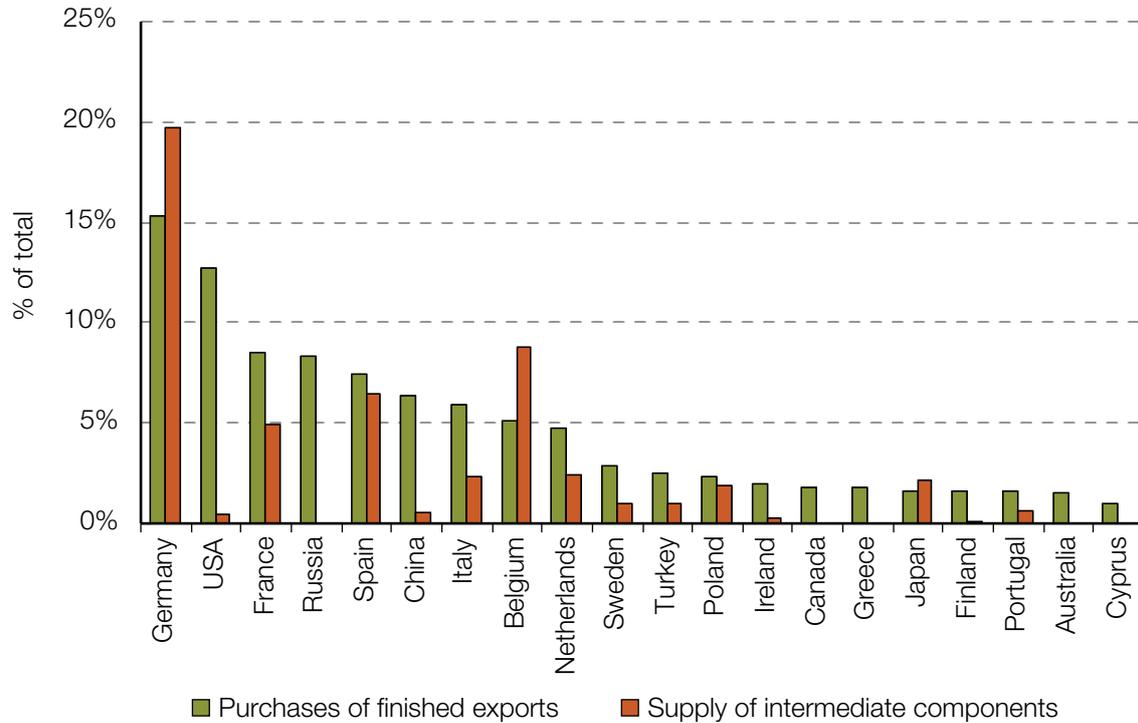
**will be formalised as one of the standing sub-groups of the Automotive Council.** Its remit will be to drive industry and government collaboration in providing a UK business environment that positively assists in positioning the UK amongst the global leaders for the design, engineering and manufacture of automotive vehicles and high-value components. The group will also actively seek opportunities for collaboration with other sectors on common issues. It will be chaired by a senior industry member of the Automotive Council and its membership will reflect the strength and diversity of the UK automotive sector.

## Maintaining strong interaction with Europe

- 5.11 The automotive industry in the UK is fully integrated into the EU industry, with significant EU supply chains and substantial exports of finished vehicles and engines to EU markets.<sup>68</sup> The Automotive Council believes that the UK's active membership of the EU is an essential factor in the automotive industry's current and future success.
- 5.12 The UK is an influential member of the EU, and the Government is committed to making the EU more competitive, to deepening the Single Market, and to tackling remaining barriers to trade. Exports are increasingly important for the UK sector. As a member of the EU, the UK benefits from all EU free trade agreements with third countries, and the Government is committed to securing ambitious free trade deals which will provide essential jobs and growth over the coming years.

<sup>68</sup> The World Input Output Database from Eurostat allows final demand and demand for intermediates for individual countries to be separated out for the first time, significantly increasing understanding of supply-chains and final demand in exports.

Chart 5.A: European markets are a major source of demand for UK finished products and a major source of supply for motor vehicle components



Source: World Input Output Database, Groningen Growth and Development Centre, April 2012. Data for motor vehicles, trailers & semi-trailers products, transport equipment sector.

5.13 The European Commission's CARS 2020 Action Plan for a competitive and sustainable European automotive industry will impact on the industry in the UK. The Government is working with the industry to engage with and influence EU policy and regulatory development to secure outcomes that benefit the competitiveness of UK industry.

### A strong voice in Europe

5.14 The UK has been a key player in the development of the Single Market, pressing for further liberalisation and removal of internal barriers, and contributing to the framing of all rules and regulations affecting the Single Market. These have included employment, health and safety legislation, the development of technical regulations affecting vehicles, rules on labelling requirements, and advertising. The industry, individual companies and, via the Technical Committees of its Trade Association, the SMMT, have a good working relationship with Departmental policy leads on European policy and technical dossiers affecting the sector.

- 5.15 The Government remains committed to continuing to provide an influential voice in shaping the development of regulations in the EU to ensure the competitiveness of the EU internationally, as well as of UK automotive manufacturers. The Government and industry will work together to ensure that this mutual understanding of industry priorities and Government engagement continues.

#### Supporting free trade

- 5.16 Access to markets outside Europe is vital to the viability of the industry in Europe, as the world's largest producer of vehicles and a net exporter of vehicles. Exports to third countries are an increasingly important part of business for the UK automotive sector.
- 5.17 The Government is committed to pursuing a free trade agenda, delivering open and fair markets. The Government strongly supports EU's strategy on global trade, and aims to negotiate ambitious and comprehensive Free Trade Agreements between the EU and key trading Partners. These trade agreements bring real benefits to UK business, including automotive.
- 5.18 A top trade priority for the Government is the launch of negotiations towards a Transatlantic Trade and Investment Partnership (TTIP). Potentially huge benefits are to be had from a truly ambitious agreement that addresses non-tariff barriers, including regulations, standards and intellectual property practices, The USA is already an important export market for UK automotive products and the European automotive sector has been identified as one of the major beneficiaries of a comprehensive TTIP agreement.
- 5.19 Non tariff barriers are a major blockage to free and fair trade, placing additional costs on exporters and the Government is committed to tackling these for UK exporters bilaterally and via the EU. The Government endorses the EU focus on the regulatory barriers to trade and investment that businesses encounter outside the Union. For example, removal of non tariff barriers and improving market access are requirements in negotiations on the EU/Japan Free Trade Agreement.
- 5.20 Representatives from automotive companies in the UK and the SMMT and BIS/DFID Trade Policy officials have established a good working relationship to discuss their concerns about the automotive chapters of on-going Free Trade agreement negotiations, discussing non-tariff barriers related to agreeing the negotiating mandate for the EU/Japan Free Trade negotiations. **The Government and the industry are committed to continuing this collaborative approach.**

## Providing a supportive national and local business environment

- 5.21 The UK scores well against Western European competitors for the overall ease of doing business.<sup>69</sup> Ensuring that the UK maintains this position and remains a destination of choice for the automotive sector is crucial.
- 5.22 The UK faces competitive pressure on costs from emerging economies as well as more established ones. The total cost of doing business is key to maintaining competitiveness. Some key areas of policy can have a negative impact on competitiveness where businesses in the UK face costs competitors do not.
- 5.23 For example, energy costs in the UK are increasing as investment in ensuring future security of supply and reduced greenhouse gas emissions takes place. In addition, businesses must comply with a number of schemes that can also increase costs. This includes levies such as the Climate Change Levy, the Carbon Reduction Commitment and the Carbon Floor Price. The impact of these schemes can be compounded by complex regulations with overlapping but different requirements for management, measurement, verification and reporting create administrative costs that can be significant.
- 5.24 The industry supports investment in clean, reliable energy supplies. A secure supply of energy is critical for manufacturing businesses. Automotive companies invest continuously in enhancing their own competitiveness including reducing their energy consumption to control costs. However some smaller businesses can struggle to make cash available to invest an optimal amount in reducing their own energy use.
- 5.25 There are also advantages for industrial users of energy from the UK's competitive energy market. This includes a choice of suppliers and the ability to make more sophisticated commercial deals with suppliers to manage risks around energy supply and costs.
- 5.26 To maintain overall cost competitiveness, increases in some costs (such as energy) means other costs must become more competitive. The Government understands this trade off and will work with the industry to identify cost challenges as a result of policy decisions and to seek to reduce such costs and improve overall competitiveness.
- 5.27 In addition to improving their energy performance, the industry is also improving its wider sustainability. For example reducing the amount of water used in the production process of each vehicle and the amount of waste sent to landfill. This has been achieved even as the number of vehicles produced

<sup>69</sup> *Global Competitiveness Report*, World Economic Forum, 2012-13 and *Doing business*, World Bank, 2013

has been increasing. The industry has also committed to make further progress in enhancing their sustainability.<sup>70</sup>

5.28 The national and local business environment covers a range of cross cutting areas. The Government is taking action where necessary to enhance competitiveness and support growth. This includes:

- Infrastructure: Critical to enable supply chains to operate efficiently and vehicles and engines to be shipped. The Government has increased investment in infrastructure in support of the delivery of the National Infrastructure Plan.<sup>71</sup> In addition, the Government has announced an increase in capital spending plans by £3 billion a year from 2015<sup>72</sup>
- Planning: The Government has acted to address constraints in the land use planning system including reforms to the regime for major infrastructure and reforms to improve local planning performance, for example in the Growth and Infrastructure Act 2013
- Local economic development: the Government has supported local enterprise partnerships (LEPs) to be formed to lead local economic development. In addition new Enterprise Zones have been established to encourage investment and City Deals have been agreed to enable development of key urban areas. To support local economic development, the Government has announced the creation of a Single Local Growth Fund (SLGF) with over £2 billion of budgets from skills, housing and transport for 2015-16. In Scotland, Wales and Northern Ireland, local economic development is the responsibility of the Devolved Administrations<sup>73</sup>

### A flexible workforce

5.29 The OECD rates the UK as having the third most competitive employment law regime in the developed world. Regulation is lighter than all the UK's European competitors and than key emerging economies including Brazil, Russia, India and China.



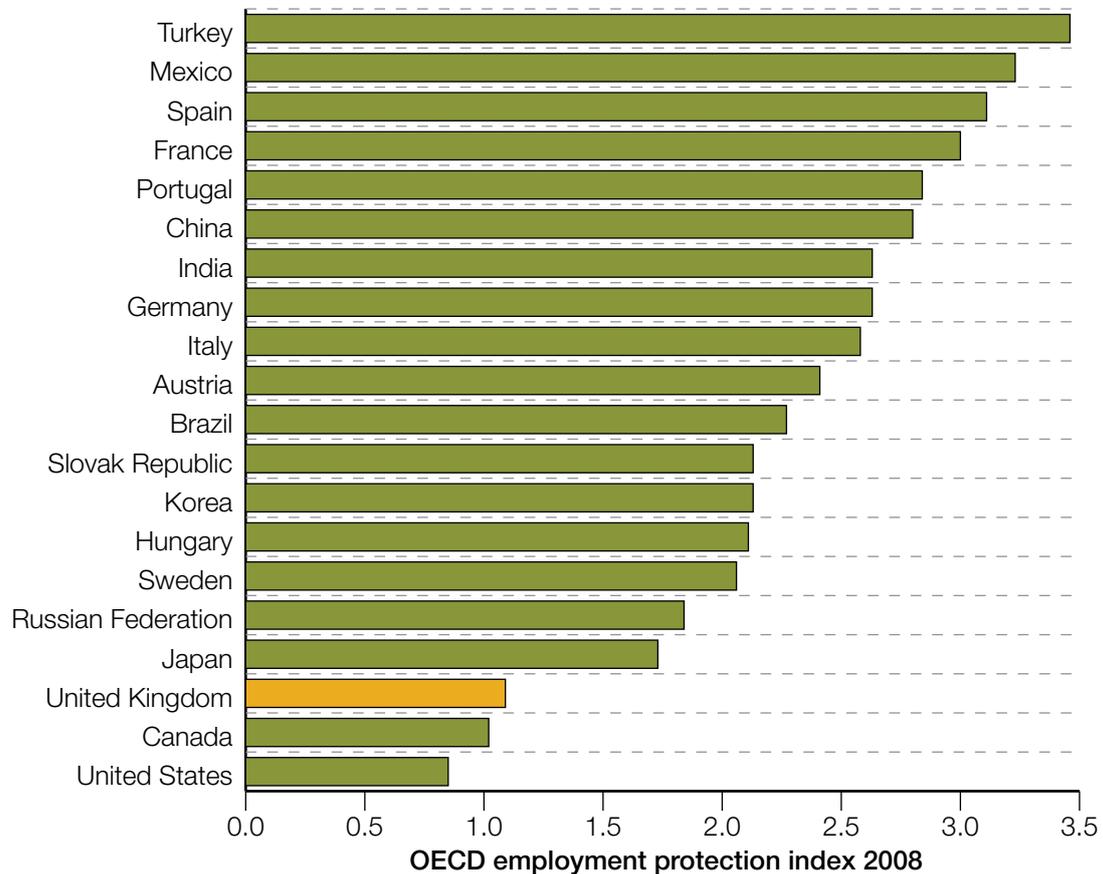
<sup>70</sup> 2013 Automotive Sustainability Report, SMMT, July 2013

<sup>71</sup> National Infrastructure Plan 2011, HM Treasury, November 2011, National Infrastructure Plan: update 2012, HM Treasury, December 2012 and Budget 2013, HM Treasury, March 2013

<sup>72</sup> Investing in Britain's future, HM Treasury, June 2013

<sup>73</sup> Investing in Britain's future, HM Treasury, June 2013

Chart 5.B: OECD Employment Protection Index 2008



Source: *Legislation, Collective Bargaining and Enforcement: Updating the OECD Employment Protection Indicators*, Social, Employment and Migration Working Paper no. 89, OECD, Paris

5.30 The UK workforce has been a key asset to the automotive industry, in particular its flexibility to meet changing requirements. The industry has in most cases worked constructively with trade unions to deliver change that allows the UK to compete. This is a significant attraction to investors and allowed the automotive sector in the UK to be agile in its response to the recession.

**The Government remains committed to maintaining and enhancing the UK's flexible labour market.**

### A competitive tax system

5.31 The competitiveness of the UK corporate tax system is a key concern for the automotive sector, as for other sectors. In the Plan for Growth, the Government committed to establishing the most competitive corporate tax system in the G20.<sup>74</sup> For manufacturers, especially in growing sectors with significant investment, other aspects of the tax and investment incentives arrangements

<sup>74</sup> *Plan for Growth*, HM Treasury and Department for Business, Innovation and Skills, 2011

can be particularly important, for example support for capital investment and for investment in research and development (R&D).

- 5.32 The Government has also committed to enhancing the competitiveness of the UK Corporation Tax system. The main rate of corporation tax has been reduced from 28 per cent in 2010 to 23 per cent in 2013. It is set to fall further, reaching 20 per cent, the lowest rate in the G20, in 2015.<sup>75</sup> The Government has also introduced a Patent Box that will give a reduced 10 per cent rate of corporation tax on profits from patents and certain other similar types of intellectual property (IP). Above the line R&D tax credits have been introduced that enable the cost of R&D activity in the UK to be reduced.
- 5.33 With significant investment in R&D, the R&D tax credits system is of particular importance for the UK's attractiveness to the global automotive sector. In April 2013 a new above-the-line R&D Tax Credit system was introduced for large businesses. This change had been called for by the automotive industry and the industry strongly supports the introduction of the new system and will promote and monitor the use of R&D Tax Credits throughout the sector. More broadly, the industry welcomes the clear commitment from the Government to a stable and competitive tax regime that creates a level playing field for the sector.
- 5.34 In order to provide tax certainty to business and to support the wider automotive industry the Government made a commitment at Budgets 2012 and 2013 to pre-announce in advance company car tax changes instead of changes coming into effect immediately. As such, company car tax rates and bands are set three years in advance and other minor forms of company car taxation like the fuel benefit charge and the van benefit charge are set one year ahead.
- 5.35 **The Government will continue to enhance the competitiveness of the UK tax system.** Decisions on tax are for the Chancellor of the Exchequer and must be taken in the context of the wider fiscal position. In developing policy, the Treasury undertakes extensive engagement with businesses including from the automotive sector.
- 5.36 To enhance engagement with the automotive industry, a senior Treasury representative will join the Automotive Council at least once a year to participate in the Council's wide-ranging debate, to update the industry on recent developments, and to allow industry to feedback on what is working and share any concerns.
- 5.37 The Treasury will seek to ensure that R&D Tax Credits remain effective in delivering increased R&D investment in the UK. The Government will continue

<sup>75</sup> Budget 2013, HM Treasury, March 2013

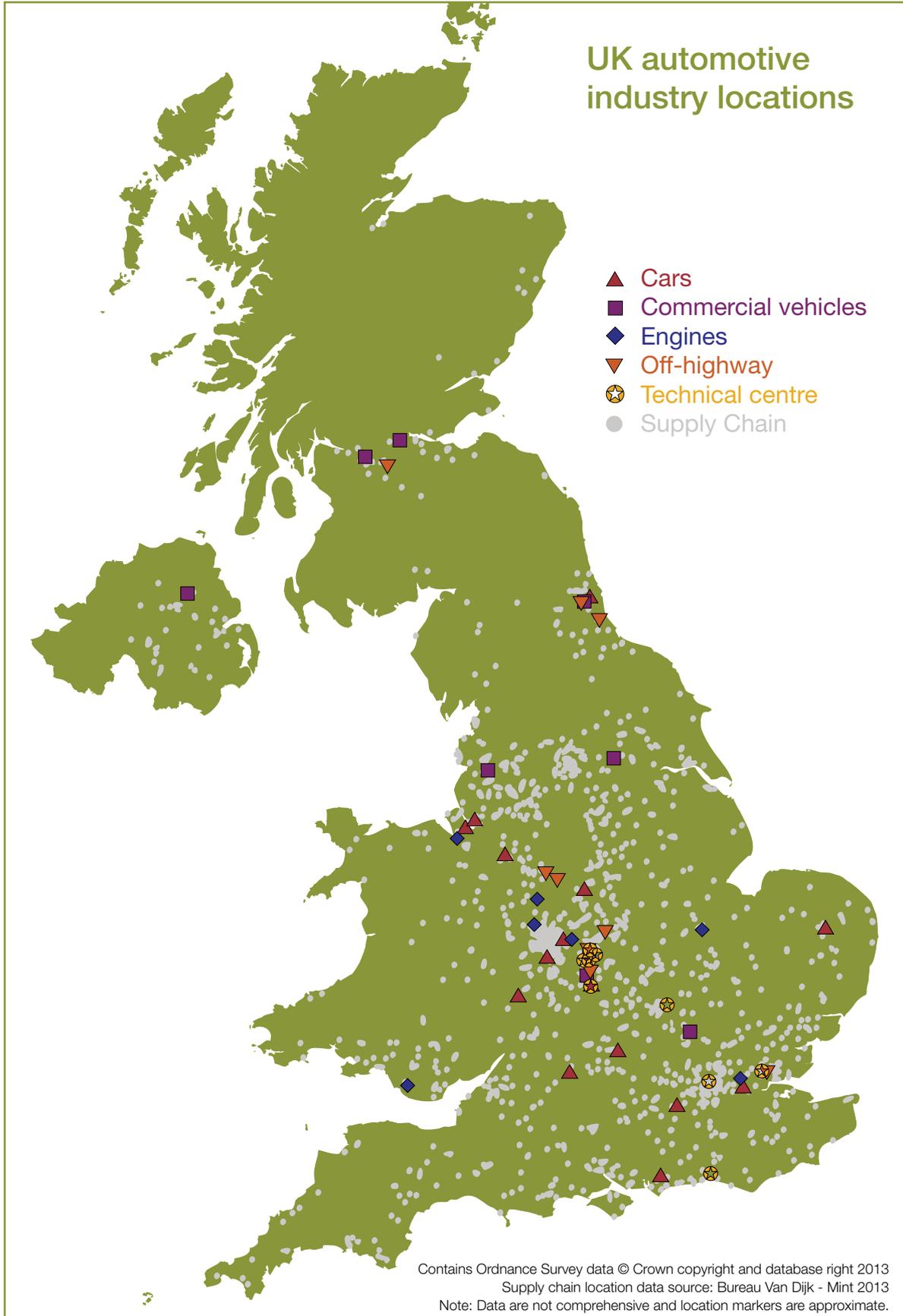
to work with the industry to assess the usage and impact of R&D Tax Credits in the automotive sector. This will include consideration of the impact of increased focus on support for R&D in key European competitors and in emerging economies such as China and India.

### Delivering locally

- 5.38 Local decision-makers are becoming increasingly empowered in the UK, allowing the local business environment to respond to the needs of major employers and to attract new investors. As the Heseltine Review is implemented, local enterprise partnerships (LEPs) and other local decision makers will play an increasingly important role in facilitating investment at a local level. **The Automotive Council will improve strategic interaction with the key automotive LEPs, devolved partners and other local decision makers, bringing them together with members of the full Council twice a year to determine strategic priorities for local and regional implementation of the national strategy.**
- 5.39 The Government has established 24 enterprise zones across England. These benefit from a number of incentives: business rate relief, simplified planning and superfast broadband whilst zones located in assisted areas also benefit from enhanced capital allowances for plant and machinery. Local enterprise partnerships are leading the delivery of enterprise zones in their area and zones have a sectoral focus that reflects their area, including some with a particular automotive focus. These have the ambition to create strong automotive clusters with enhanced local supply chains. The Government is working collectively to help maximise the opportunities these zones present for the UK automotive sector.

### Case study 5.A: North East Enterprise Zone

As the UK's first designated Low Carbon Economic Area, the North East is pioneering the adoption of electric vehicles and low carbon vehicle technologies. The location of the North East Enterprise Zone (EZ) sites next to Nissan in Sunderland reflects this ambition and the LEP's commitment to grow the automotive sector, the supply chain and R & D. These sites have secured £50 million of public/private investment to date. Vantec, part of the Hitachi group, was the first company to locate on the EZ and since early 2013 its 39,000 square metre logistics plant has been serving growth at the Nissan car plant. Gateshead College is expanding onto the EZ investing further in R & D and training in automotive low carbon technologies.



## Creating a competitive and supportive domestic market for vehicles

- 5.40 A strong domestic vehicle market provides an additional incentive to invest in the manufacture of vehicles and components in the UK. The UK has a large, open and highly competitive domestic market for vehicles. Unlike the market in most of the rest of the EU, the UK domestic market is growing.
- 5.41 In 2012, over 2 million new cars were registered, overtaking annual volumes in France and coming second only to Germany. Of this total, 13.5 per cent were produced in UK with the balance imported, whilst 83 per cent of domestic car production was exported.
- 5.42 The Government is a significant purchaser of vehicles. £1.5 billion of vehicle procurement is planned over the next four years. To ensure a greater range of manufacturers are able to compete for future public procurement, including those based in the UK, the Government publishes an investment pipeline setting out these future contracts. In addition, **the Government will engage with potential suppliers of vehicles to ensure upcoming opportunities are understood.**

### Encouraging demand for ultra-low emission vehicles

- 5.43 The development of ultra low emission vehicles is a key priority for the automotive sector. Through the activities of the Office of Low Emission Vehicles, the Government is actively supporting the supply, demand and use of these vehicles (see Chapter 2).
- 5.44 OLEV is currently supporting the early market for ULEVs by taking action to encourage demand (for example, providing an incentive of up to £8,000 for ULEV vans and £5,000 for cars), enable use of the vehicles (for example, funding for chargepoints), and encourage supply (for example, investing in R&D activities) with £400 million funding to 2015. The Government recognises the lengthy investment time horizons in the car industry, and has confirmed its commitment to further support the transition to ULEVs to 2020 (or until the early market is fully established). The Government will make funding available through the Department for Transport to continue this support and will shortly publish details of this commitment. The Government will also publish a strategy for this sector later this year.

5.45 In addition, at Budget 2013 the Government announced a £100m package to support the purchase and manufacture of ULEVs in the UK through company car tax (CCT) and the capital allowances regime. The Government is guaranteeing reduced rates of CCT for ULEVs until 2020; and extending the 100 per cent first year allowance (FYA) for ULEVs until 2018. These incentives will be reviewed in light of market developments at Budget 2016. The Government will continue to work with the sector to monitor the ULEV market.

## 6 Next steps

- 6.1 This automotive sector strategy established a clear vision and programme of work for the industry and the Government to ensure a healthy future for automotive design and manufacturing in the UK.
- 6.2 The Automotive Council will publish an update on progress implementing this strategy on an annual basis.

Action	Lead	Due Date
<b>Cross cutting themes</b>		
Re-commitment to working together through the Automotive Council	Industry and BIS	Ongoing
Establish a standing business environment sub-group of the Automotive Council	Industry and BIS	July 2013, first meeting autumn 2013
<b>Innovation and Technology theme</b>		
Invest around £1 billion over 10 years to establish a new Advanced Propulsion Centre	Industry and Government	Operational from spring 2014
Recommit to prioritisation of technologies and collaboration with TSB, EPSRC and others	Automotive Council Technology Group	Ongoing
Consider opportunities for more EU R&D funding	Automotive Council Technology Group	Ongoing
Enhance engagement with motorsport industry including consideration of results of survey with MIA	Automotive Council Technology Group	Ongoing
Publish detailed consensus technology roadmaps for each of the priority technologies	Automotive Council Technology Group	By end 2013
Analyse future technology challenges and UK capabilities	Automotive Council Technology Group	Ongoing

Action	Lead	Due Date
UKH <sub>2</sub> Mobility to produce business case for hydrogen fuel cell electric vehicles	UKH <sub>2</sub> Mobility	By end 2013
Improve coordination and collaboration with academic research community	Automotive Council Technology Group and EPSRC	Ongoing
Industry sponsors of intelligent mobility demonstration programme to consider funding options	Industry	Ongoing
<b>Supply Chain theme</b>		
Design and implement a framework for collating and communicating supply chain opportunities and identifying existing supplier capacity and capabilities	Automotive Council Supply Chain Group and SMMT	Ongoing
Implement supplier development programme	Industry and SMMT	Subject to AMSCI funding bids
Investigate international best practice for support structures that enable long term development and growth of supply chain companies	Automotive Council Supply Chain Group	Ongoing
Enhance collaboration to promote UK suppliers overseas	Industry and UKTI	Ongoing
Define the innovative business and manufacturing processes needed to support premium UK manufacturers	Automotive Council Supply Chain Group	Ongoing
Establish a new Automotive Investment Organisation	UKTI	Announced June 2013
Vehicle/engine makers and SMMT jointly develop targeted priorities for UKTI engagement	Industry and SMMT with UKTI	Ongoing
Consider how to improve UKTI one-stop-shop for inward investors	UKTI, BIS and Automotive Council Supply Chain Group	Ongoing
Continue to work to together to improve mutual understanding	Automotive Council and the BBA	Ongoing

Action	Lead	Due Date
Implement tooling finance framework agreement	Industry and the banks	Ongoing
Develop long-term investment finance products for the automotive industry	Industry, the banks and other finance providers	Ongoing
Target professional mentoring services towards automotive SMEs	BBA and the banks	Ongoing
<b>Skills theme</b>		
Take steps to increase number of young people moving through STEM pipeline	DfE and BIS	Ongoing
Develop and implement consensus automotive skills roadmap	Automotive Council Business Environment Group and BIS	Ongoing
Recruit more than 7,600 additional apprentices and 1,700 additional graduates over the next five years	Industry	Ongoing to 2018
Pursue Industrial Partnership Employer Ownership of Skills bid	Industry	Ongoing
Continue to participate in the next phase of See Inside Manufacturing	Industry working with Government	October 2013
Bring together careers information, advice and guidance that encourages young people to choose careers in automotive	Automotive Council Business Environment Group	Ongoing
Improve the quality and quantity of graduates coming into automotive	Automotive Council Business Environment Group and BIS	Ongoing
Seek ways to ensure talented people are attracted to automotive relevant university courses	Automotive Council Business Environment Group and BIS	Ongoing
Create an Automotive Council scholarship scheme	Automotive Council Business Environment Group	Ongoing

Action	Lead	Due Date
Explore options to widen availability of the modular Masters Advanced Skills Accreditation Scheme	Automotive Council Business Environment Group and BIS	Ongoing
Top executives from the industry to personally engage with schools and their students	Industry	Ongoing
<b>Business Environment theme</b>		
Maintain and enhance the UK's flexible labour market	BIS	Ongoing
Continuing to enhance competitiveness of the UK tax system	HM Treasury	Ongoing
Automotive Council new strategic engagement with LEPs, devolved partners and other local decision makers	Industry and BIS	Ongoing
Engage with potential suppliers of vehicles to ensure upcoming public procurement opportunities are understood	Cabinet Office	Ongoing
Continuing to be influential in shaping development of EU regulations	DfT and BIS	Ongoing
Ensuring industry priorities input to EU negotiations	Industry, DfT and BIS	Ongoing
Continuing a collaborative approach to trade negotiations	Industry and BIS	Ongoing

UK automotive products:  
**Commercial, construction and agriculture**



Alexander Dennis



Case  
New  
Holland



Caterpillar



JCB



Komatsu



Leyland Truck



London Taxi Company



Optare



Perkins



Smith  
Electric Vehicles



Terex



Thwaites



Vauxhall  
Commercial  
Vehicles/GM



Wright Bus

© Crown Copyright 2013

You may re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence. Visit [www.nationalarchives.gov.uk/doc/open-government-licence](http://www.nationalarchives.gov.uk/doc/open-government-licence), write to the Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: [psi@nationalarchives.gsi.gov.uk](mailto:psi@nationalarchives.gsi.gov.uk).

This publication available from [www.gov.uk/bis](http://www.gov.uk/bis)  
Any enquiries regarding this publication should be sent to:  
Department for Business, Innovation and Skills.

1 Victoria Street  
London SW1H 0ET  
Tel: 020 7215 5000

If you require this publication in an alternative format, email [enquiries@bis.gsi.gov.uk](mailto:enquiries@bis.gsi.gov.uk), or call 020 7215 5000.

BIS/13/975